The Effect of Fermented *Sauropus androgynus* Leaves on Performance, Fat Deposition and Carcass Quality in Broiler Chicken

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ABSTRACT

The present study was conducted to evaluate fermented *Sauropus androgynus* leaves on performance of broiler chickens. One hundred and twelve broiler chicks aged fourteen days were distributed to seven treatment groups as follows. One tretamnet group of broiler chickens was fed diet without fermented *Sauropus androgynus* leaves as control group (P0), and other treatments groups of broiler chickens were fed diets contained 2.5 % Neurospora sp fermented *Sauropus androgynus* leaves (P1), diets contained 5 % *Neurospora sp* fermented *Sauropus androgynus* leaves (P2), diets contained 2.5 % EM4 fermented *Sauropus androgynus* leaves (P3), diets contained 5 % EM4 fermented *Sauropus androgynus* leaves (P4) and diets contained 2.5 % *Saccharomyces sp* fermented *Sauropus androgynus* leaves (P5) and diets contained 5% *Saccharomyces sp* fermented *Sauropus androgynus* leaves extract. Experimental results showed that fermented *Sauropus androgynus* had no effect ($P>0.05$) on body weight gain, feed consumption and feed conversition ratio. It was shown that fermented *Sauropus androgynus* significantly reduce total fat deposition, but it improved carcass qualities. In conclusion, fermented *Sauropus androgynus* improved carcass qualities and reduced fat deposition without lowering broiler performance.

Key words: Fermeneted *Sauropus androgynus* leaves, fat deposition, carcass quality, broiler

INTRODUCTION

Poultry industry was faced on demand of consumers to produce broiler chicken with lower fat depositon and better meat quality and composition and no synthetic chemical residue in meat. It was known that commercial feed additive contained synthetic compound which might be accumulated in meats, and they were not rich in β-caarotene and other compounds which could improve meat qualities. In addition, commercial feed additive had no ability to produce meat with free pathogenic microorganisms (Santoso *et al*., 2001[a,b,c]; Santoso *et al*., 2002). Synthetic chemistry had greater side effects such as impaired hormonal system and immunity.

To overcome these problems, it is necessary to look for alternative natural feed additive that can replace commercial feed additive and is capable to produce meats with high quality. The natural feed additive must contain active compounds that provide a smaller side effect of the synthetic chemical compounds as well as the potential to be used as a feed additive for producing meats with high qualities. Natural feed additive feed additive has the potential to replace the commercial include medicinal plants. One of the medicinal plants that meet the above criteria to produce meat with high quality is Sauropus androgynus leaves (Santoso, 2014).

Sauropus androynus leaves contains six main compounds, namely monomethyl succinate and cis-2-methyl cyclopentanol acetate, benzoic acid, malonic acid phenyl, 2-pyrolidinon and methyl pyroglutamate (Agustal *et al*., 1997). Methyl pyroglutamate if consumed by birds might increase the synthesis of amino acids and therefore increased protein synthesis (Santoso *et al*., 2005). Furthermore, glutamate is an intermediate in the synthesis of proteins. Synthesis of amino acids and proteins require high energy, and this would cause lower fat deposition. Monomethyl succinate and acetate methylcyclopentanol could be expected to be converted to succinate and acette. Acetate and succinate may play a role in the Kreb cycle to produce ATP greater. This resulted in the efficiency of energy metabolism for the better. Higher metabolic efficiency is expected to improve feed efficiency. Phenyl malonic acid can be converted into malonil-CoA which plays an important role in the metabolism of fatty acids. In addition, acetate and succinate role in fat metabolism. Based on these assumptions, the

Sauropus androgynus leaves extract could be expected to modify fat deposition and meat qualities in broiler chickens. Santoso and Sartini (2001) found that suplementation of *Sauropus androgynus* leaves meal by 3% in broiler diet improved feed efficiency by 10% and decrease the accumulation of abdominal fat by 30% and lower carcass fat content. However, it decreased body weight because of a high antinutrition in *Sauropus androgynus* leaves. To reduce antinutrition, the leaves could be fermented.

MATERIALS AND METHODS

The present study used broiler chickens aged 14 days of age. One hundred and twelve broiler chicks were distributed to 7 treatment groups with 4 replicates of 4 broiler chicks each as follows.

- Broiler fed diets without Sauropus androgynus leaves as the control.
- Broilers fed diets with 2.5% Sauropus androgynus leaves fermented by Neurospora crassa.
- Broilers fed diets with 5% Sauropus androgynus leaves fermented by Neurospora crassa
- Broilers fed diets with 2.5% Sauropus androgynus leaves fermented by Lactobacillus sp (EM4)
- Broilers fed diets with 5% Sauropus androgynus leaves fermented by Lactobacillus sp (EM4)
- Broilers fed diets with 2.5% Sauropus androgynus leaves fermented by Saccharomymes cereviceae
- Broilers fed diets with 5% Sauropus androgynus leaves fermented by Saccharomymes cereviceae.

All broiler chikens were fed ad libitum. Experimental diets contained 19% crude protein and ME 3200 kcal/kg. Broiler chickens were maintained in a house with continuous lighting with standard operation. Broiler chcikens were subjected to experimental diet from 15 to 35 days of age.

At the end of experiment (35 days of age), 4 broiler chickens in each treatment groups were selected and slaughatered, and fat deposition and carcass qualities were measured. All data were subjected to analysis of variance, and if it was significantly different it was further tested by Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Effect of fermented *Sauropus androgynus* leaves on broiler performance was shown in Table 1. It was shown that fermented *Sauropus androgynus* had no effect on body weight gain, feed consumption and feed conversion ratio ($P>0.05$).

Effect of fermented *Sauropus androgynus* leaves on fat deposition in broiler chickens was shown in Table 2. It was shown that fermented *Sauropus androgynus* leaves had no effect on abdominal fat, gizzard fat, sartorial fat and heart fat ($P>0.05$), but it significantly different on neck fat, FLS and total fat depot ($P<0.05$).

Table 1. Effect of fermented *Sauropus androgynus* leaves on broiler performance

	P0	P1	P2	P3	P4	P5	P6
BW, g/bird/week	386.3	358.8	346.3	332.6	304.9	407.6	393.7
Consumption, g/bird/week	816.4	780.9	736.2	736.2	705.8	811,8	775.2
FCR	2.11	2.18	2.13	2.21	2.31	1.99	1.97
Toxicity score	2.27^a	2.25^a	2.36^a	2.43^a	3.04^b	2.23^a	2.30^a

P0= control; P1= diets with 2.5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P2= diets with 5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P3= diets with 2.5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P4= diets with 5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P5= diets with 2.5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae*; P6= diets with 5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae.*

Effect of fermented *Sauropus androgynus* leaves on carcass qualities was shown in Table 3. It was shown that fermented *Sauropus* androgynus had no effect on carcass, leg, breast, leg meat, breast meat and meat bone ratio for leg ($P>0.05$), but it significantly different on leg bone, leg skin and meat bone ratio for breast ($P<0.05$). Carcass color were better in P1, P2, P3 and P5 than P0. Meat color was better in P3 and P4 than P0. Carcass odor were better in P5 and P6 as compared with P0.

Table 2. Effect of fermented *Sauropus androgynus* leaves on fat deposition in broiler chickens

	P0	P1	P2	P3	P4	P5	P6
Abdominal, %	0.85	1.02	1.04	1.29	0.85	1.13	1.23
Heart, %	0.07	0.09	0.05	0.05	0.07	0.05	0.10
Neck, %	0.10^{b}	0.06^{ab}	0.06^{ab}	0.05^{ab}	0.05^{ab}	0.07^{b}	0.03^{a}
Gizzard, %	0.52	0.52	0.41	0.35	0.31	0.45	0.38
Sartorial, %	0.47	0.47	0.40	0.59	0.26	0.68	0.40
Total, %	2.00^{b}	2.15^{b}	1.97^{b}	2.34^{b}	1.54^{a}	2.37^{b}	2.14^{b}
FLS	1.4^{b}	1.5^{b}	1.5^{b}	1.1^{a}	1.6^{b}	1.0^{a}	1.1^{a}

P0= control; P1= diets with 2.5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P2= diets with 5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P3= diets with 2.5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P4= diets with 5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P5= diets with 2.5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae*; P6= diets with 5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae.*

Although it was not significantly different, broiler chickens fed diets with 2.5% Sauropus androgynus leaves fermented by *Saccharomyces cerviceae* had the best feed conversition ration (FCR) and body weight gain. If this result was compared with the results of Santoso and Sartini (2001) – who found that *Sauropus androgynus* leaves tended to reduce body weight gain, fermentation of *Sauropus androgynus* leaves by *Saccharomyces cereviceae* improved broiler performance.

Table 3. Effect of fermented *Sauropus androgynus* leaves on carcass qualities

	P0	P1	P2	P3	P4	P5	P6
Carcass wt, %	68.3	68.4	65.4	68.1	66.0	68.4	68.9
Carcass color	102.4	103.3	102.9	102.9	102.1	102.9	102.4
Meat color	2.9^{a}	3.0^{a}	3.1^{a}	3.8^{b}	3.5^{b}	3.3^{a}	2.9^{a}
Carcass odor	3.25^{b}	3.75^{bc}	2.5^{ab}	2.75^{ab}	3.25^{b}	2.38^{a}	1.75^{a}
Cooking loss, %	24.3	19.7	23.5	20.2	20.3	20.7	22.2
Leg weight, %	21.4	23.9	21.9	21.9	20.4	22.1	21.3
Breast weight, %	20.3	21.1	21.1	20.2	19.6	24.0	21.9
Leg meat, %	14.0	14.4	13.8	14.2	13.0	13.6	14.5
Breast meat, %	17.6	17.8	17.8	17.3	16.3	20.3	18.5
Leg bone, %	4.4	6.7	5.2	5.7	5.0	5.0	4.3
Breast bone, %	2.7	3.3	3.3	2.9	3.3	3.7	3.0
Leg skin, %	2.9	2.8	2.9	2.0	2.4	3.5	2.5
Meat/bone (breast)	6.67	5.6	5.6	9.39	5.25	5.83	6.54
Meat/bone (leg)	3.18	2.34	2.66	2.64	2.65	2.81	3.45

P0= control; P1= diets with 2.5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P2= diets with 5% *Sauropus androgynus* leaves fermented by *Neurospora crassa*; P3= diets with 2.5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P4= diets with 5% *Sauropus androgynus* leaves fermented by Lactobacillus sp (EM4); P5= diets with 2.5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae*; P6= diets with 5% *Sauropus androgynus* leaves fermented by *Saccharomyces cereviceae.*

A beter meat color in broiler chickens fed EM4 fermented *Sauropus androgynus* leaves was still unclear. It was known that *Sauropus androgynus* leaves was rich in Fe and EM4 fermentation might increase teh availability of Fe for broiler chickens. Better carcass color might be caused by β-carotene. It was known that *Sauropus androgynus* leaves contained high this pigment. It appear that fermentation had no effect on this pigment content. Carcass odor was lower in broiler chickens fed *Saccharomyces cereviceae* fermented *Sauropus androgynus* leaves. The mechanism of this fenomenon was still unkown.

CONCLUSION

It was concluded that fermented *Sauropus androgynus* leaves did not improved broiler performance, but it improved carcass quality as indicated by better carcass and meat color and lower carcass odor.

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