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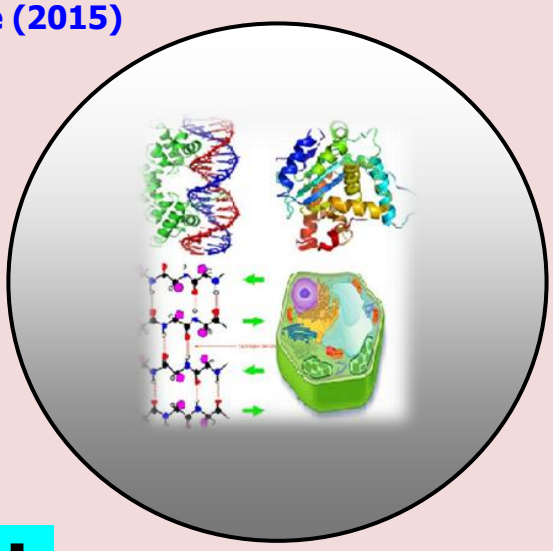

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Effect of Fermented Papaya Leaf Waste Supplementation on Growth Performance and Blood Lipids Profile of Female Bali Ducks

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ABSTRACT

The research aims to know the effect of fermented papaya leaf waste supplementation in diets on growth performance and blood lipids profile of female bali ducks have been investigated. A complete randomezed design with three treatments and seven replications were used in this experiment. The treatments were: T0 (control, diet without fermented papaya leaf waste), T1 (diet contain 5% fermented papaya leaf waste) and T2 (diet contain 10% fermented papaya leaf waste). The variables observed were: feed and water consumptions, body weight gain, final body weight, Feed Conversion Ratio (FCR), blood cholesterol, triglyceride, LDL and HDL. The results showed that feed consumption in treatment T1 and T2 were respectively 9,01% and 8,13% significantly (P<0.05) higher than treatment T0. Fermented papaya leaf waste at level of 5% and 10% not significantly (P>0.05) affect on increasing of water consumption, body weight gain, last body weight, and FCR value. Blood cholesterol, triglyceride, and LDL were decreased but HDL increased along with the level of fermented papaya leaf waste. It can be concluded that fermented papaya leaf waste in the diets at the level of 5-10% could increased feed consumption and HDL, decreased blood triglyseride and LDL, but not affect on water consumption, body weight gain, last body weight, FCR and blood cholesterol of female bali ducks.
Keywords: Fermented Papaya Leaf, Performance, Blood Lipid and Bali Duck.

INTRODUCTION

Bali duck (*Anas sp*) is the original germplasm of Indonesia which must be preserved and developed optimally in order to improve the well-being and the degree of Indonesian public health. Ducks meat not only be fond of by local society but olso foreign countries, it proven to be ducks meat as superior menu in many restaurants such as ”Bebek Bengil”, ”Tepi Sawah”, ”Laka-Leke”, etc in the tourism area of Ubud, Bali. To support the needs of ducks meat on the market, the productivity and quality of ducks meat needs to get attention. Ducks meat has a high fat, coarse texture, tought and smells fishy. One way to increase the productivity and quality of ducks meat is

utilize papaya leaf waste. According to Widjastuti (2009), papaya leaf has a relatively high nutrient content as much as 20.88% CP, 0.99% Ca, 0.47% P and 2,912 kcal/kg gross energy. Papaya leaf also contains proteolytic enzymes (papain, chymopapain and lizosim) as well as alkaloid carpaine, pseudocarpaine, carposide, saponin, glycoside, sucrose and dextrose. Chymopapain, papain and lipase can help the degradating nutrients in the diet, so it can increase the digestibility and feed efficiency, as well as the growth of livestock (Kiha et. al, 2012). Other benefits of papaya leaf are used to be meat tenderizer and subtracted the fishy smell of meat. Some vitamins, β-caroten, vitamin C and vitamin E in papaya leaf have a hipolipidemia effect and as antioxidants (Aravind et al., 2013). The positif effect of papaya leaf in the diet is decreased mortality of livestock, but it can be make bitter taste of the meat if that given excessive because papaya leaf contains alkaloid carpaine (Hartono 1994). Armando (2005) reported that given dried and fresh papaya leaf at the level of 10% and 15% caused meat flavor very bitter. He also reported that papaya leaf meal could decreased meat fat content, but not significantly effect on physic quality of kampong chickens meat. Carpaine olso have negatif effect on health because of their toxic effect. Karamudin and Slim (2002) reported that administration of papaya leaf extract at the level of 2; 2.5; and 3 ml/L water caused odema at the liver and kidney of kampong chickens. One way to reduce the toxic effect of carpaine and bitter taste of papaya leaf is by fermentation method using effective microorganism.

Based on that informations, this experiment was conduct to study the effect of fermented papaya leaf waste in diets on growth performance and blood lipids profile of female bali ducks.

MATERIAL AND METHODS

Animal and Feed

Sixty three, one week old of female bali ducks in homogen body weight (76.37±7.46 gram) were used and allocated to 3 groups (treatments) in a completely randomized design. Every treatment consist of 7 replications and every replication used 3 heads of duck, so there were 21 experimental units. The treatments were: T0 (control, diet without fermented papaya leaf waste), T1 (diet contains 5% fermented papaya leaf waste) and T2 (diet contain 10% fermented papaya leaf waste). These animal were bought from ducks breeding farm in Kediri, Tabanan, Bali, Indonesia. All ducks were given a basal diet composed of CP 511 B, corn brand, and pollard. Fermented papaya leaf waste given only in treatments T1 and T2. The ingredient and nutrient compositions of the diet are presented in Table 1.

Table 1. Ingredient and Chemical Composition of Diets Used in This Experiment.

Ingredient/nutrients	Treatments		
	T0	T1	T2
Commercial diet 511B (%)	68	65	61
Corn brand (%)	20	16	13
Pollard (%)	12	14	16
Fermented papaya leaf waste (%)	0	5	10
Total (%)	100	100	100
Nutrients			
Metabolism Energy (kkal/kg)	2918	2932	2950
Crude Protein (%)	19,40	19,54	19,55
Eter Extract (%)	5,00	5,02	5,22
Crude Fiber (%)	4.86	5,62	6,35
Ca (%)	0,65	0,83	1,00
P (%)	0,51	0,54	0,56

Note :

T0 : Control (diet without fermented papaya leaf waste)
T1 : Diets contain of 5% fermented papaya leaf waste
T2 : Diets contain of 10% fermented papaya leaf waste

Preparation of Fermented Papaya Leaf Waste

The papaya leaf used were old papaya leaf but it still green. The papaya leaf got from the farmer's papaya garden in Tabanan, Bali, Indonesia. Papaya leaf waste grind to be a meal, dried and weighting. Dried papaya leaf meal was fermented by effective microorganism (*lactobacillus sp.*, *actynomycetes*, fotosynthetic bacteria and yeast) about 5% of material weight. Papaya leaf meal which have been mixed with microbe enter to plastic bag and closed, save for 3 days and ready to mixed with other material diets.

Variables Observed

a. Feed and water consumptions were measured every week by reduced of total diet and water that given with residue
b. Last body weight is the weight that measure in the end of experiment
c. Body weight gain is differences between last body weight and initial body weight. All the ducks were fasting for 12 hours before weigthing.
d. *Feed Conversion Ratio (FCR)* is the ratio between feed consumption and body weight gain
e. Blood lipid profile : Total cholesterol, triglyserida, HDL and LDL were measured using modification reflovet plus (Rosche). The blood sample taken by reflotron pipette (30 µ L) than melted in stick test as the parameters observed. Stick contains sample inserted in reflovet plus which has already ignited first. After 2-3 minutes the result can be read on the screen. The stick that has been read take out and continue with the other stick.

Data Analysis

Data obtained from the results of the research were analyzed by Analysis of Variance. If there is significantly response among the treatments, it will be continued to Duncan Multiple Rang Test on the level of 5% (Steel and Torrie, 1986).

RESULTS

Data the effect of fermented papaya leaf waste supplementation on performance and blood lipids profile of female bali duck 10 weeks of age are represented in Table 2. The data show that supplementation of 5% (T1) and 10% (T2) fermented papaya leaf waste in diets signifiant affect ($P<0.05$) on increasing of feed consumption, but not in water consumption, final body weight, body weight gain, and FCR. Feed consumption on treatment T1 and T2 were 9.01% and 8,13% higher than control (T0), respectively. The water consumption in treatment T1 (5.47%) and T2 (6.13%) were higher than the control but not significantly different ($P>0.05$). The administration of 5% and 10% fermented papaya leaf waste in diets also produce final body weight and body weight gain higer than the control and statistically no significant different ($P>0.05$). The final body weight of treatment T1 and T2 were 2.30% and 0.84% respectively higher than T0. The highest body weight gain (1274.19 g) was found in treatment T1, followed by T2 (1267.24 g) and T0 (1244.09 g), but statistically not significant different ($P>0.05$). Average number of feed convertion ratio (FCR) were range from 5.15-5.51 and statistically not significant different among the treatments. The number of FCR in treatment T1 and T2 were 6.17% higher compare with the control.

We also observed the blood lipids profil (cholesterol, triglyceride, LDL and HDL). Fermented papaya leaf waste could reduced blood cholesterol respectively of 1.44% and 3.59%, but not significantly different.

Average number of blood triglyceride and LDL were significantly decreased and HDL increased as high as the level of fermented papaya leaf that given. The blood triglyseride was decreased as many as 2.98% in treatment T1 and 10.53% in treatment T2. The administration of 5% fermented papaya leaf waste could improve the blood HDL as many as 8.18% but not yet capable reducing the blood LDL significantly. Whereas in the level of 10% it could reduce the LDL as many as 20.84% and improve the HDL of 13.42%.

Table 2. The effect of fermented papaya leaf waste suplementation on performance and blood lipid profile of female bali duck 10 weeks of age.

Variables	Treatments[1)]			SEM[2)]
	T0	T1	T3	
Performance :				
Feed consumption (g/head/9 weeks)	6444.09 [a]	7024.95[b]	6967.71[b3)]	1.63
Water consumption (ml/head/9weeks)	29726.48 [a]	31352.29 [a]	31582.10 [a]	1.18
Initial body weight (g/head)	76.05[a]	76.29 [a]	76.76 [a]	2.58
Final body weight (g/head)	1320.14 [a]	1350.48 [a]	1344.0 0 [a]	31.14
Body weight gain (g/head/9 weeks)	1244.09[a]	1274.19 [a]	1267.24 [a]	30.64
Feed Convertion Ratio (FCR)	5.19 [a]	5.51 [a]	5.51 [a]	1.48
Blood lipid profile :				
Blood cholesterol (dl/100ml)	139.00[a]	137.00[a]	134.00[a]	4.91
Blood Trygliserida (dl/100ml)	186.10[c]	180.55[b]	166.50[a]	0.90
High Dencity Lipoprotein (dl/100ml)	76.40[a]	82.65[b]	86.65[c]	1.00
Low Dencity Lipoprotein (dl/100ml)	30.38[b]	28.24[b]	24.05[a]	1.75

Note:

1) Treatments:
   T0 : Control (diet without fermented papaya leaf waste)
   T1 : Diets contain of 5% fermented papaya leaf waste)
   T2 : Diets contain of 10% ferrmented papaya leaf waste)
2) SEM : *Standard Error of The Treatment Means*
3) Values followed by different superscript in the same row were significantly (P<0,05)

DISCUSSION

Supplementation of 5% (T1) and 10% (T2) fermented papaya leaf waste in diets have a good effect on growth performance and blood lipids profile of female bali duck 10 weeks of age. Statistical analysis show that fermented papaya leaf waste supplementation in diets generally no significantly affect on the increasing of growth performance of female bali duck, except feed consumption. Feed consumption on treatment T1 and T2 significantly (P<0.01) increased as many as 9.01% and 8,13%, respectively. This result is accordance with Unigwe (2014) that giving papaya leaf flour as much as 5%-15% significantly increased feed consumption of broiler chickens. Similar results were also obtained by Kanyinji (2014), that the replacement of 2%-6% soy flour with papaya leaf flour significantly increase feed consumption of japanese quail. The increasing of feed consumption is due to the presence of phytochemicals compounds in papaya leaf which can increase appetite of ducks. This statement is supported by Aravind (2013) that papaya leaf has many benefits of which helps digestion and increases appetite. However, the crude fiber in diet is also becoming a limiting factor as it causes gastrointestinal tract become quickly full. It may be the reason why feed consumption in treatment T2 lower than T1 (Tabel 2).

According to Rizal (2006), high content of crude fibre in the diet caused livestock will quickly feel full because the fibers are voluminous and inflate if exposed to water. Beside of that, feed consumption also affected by the water consumption. The ducks fed 5% (T1) and 10% fermented papaya leaf (T2) have higher water consumption than the control (T0) respectively of 5.47% and 6.13%, but not significantly different (P>0.05). High water consumption in treatment T2 may be caused by the requirement of water to digest the papaya leaf waste or caused by bitter sense of papaya leaf. The improvement of feed consumption in this study was followed by the improvement of final body weight and body weight gain. Body weight development of female bali duck aged of 1-10 weeks is represented in Figure 1. The graph shows that a third treatments have almost the same growth, but treatment T1 a bit better than the two other treatments. This is indicated that the optimal level of fermented papaya leaf is 5%. The administration of 10% caused reducing of feed consumption and impact on their body weight gain.

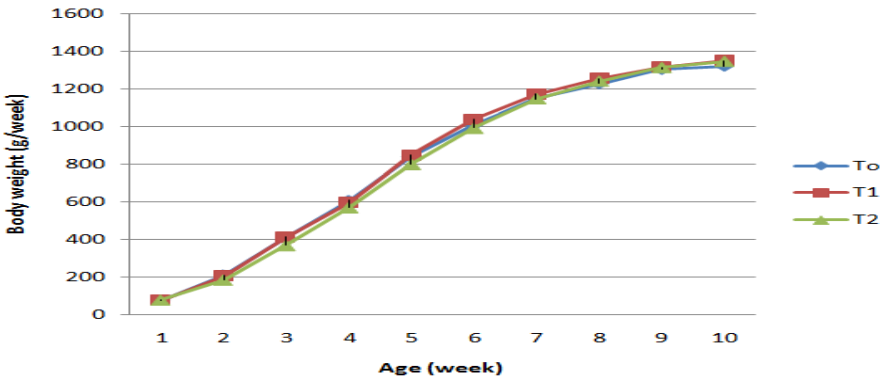

Fig. 1 The growth of female bali duck fed 0% (T0), 5% (T1) and 10% (T2) fermented papaya leaf waste.

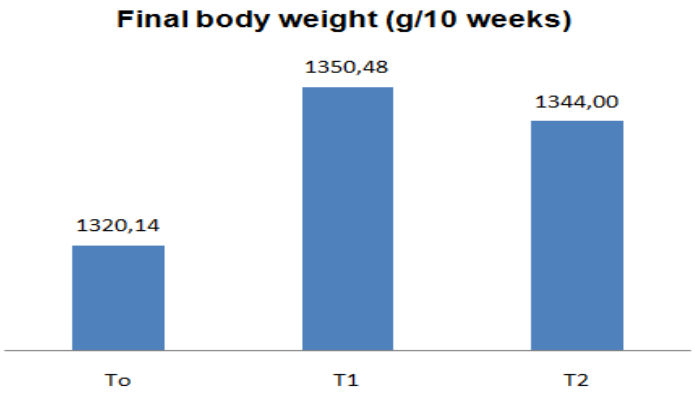

Fig. 2 The final body weight of female bali duck 10 weeks of age fed 0% (T0), 5% (T1) and 10% (T2) fermented papaya leaf waste.

The final body weight of females bali duck aged 10 weeks range between 1320.14 g–1350.48 g with the highest weight is on treatment T1 followed by T2 and T0 (Figure 2), but statistically not significant different (P>0.05). This is in line with Susanti (2001) who found that the body weight of females bali duck at 10 weeks of age is 1345,76 ± 126,96 g. Although statistically no different, the data value indicate that fermented papaya leaf waste supplementation in diets as much as 5% and 10% are able to produce higher final body weights than control (T0) each of 2.30% and 0.84%.

This shows that the fermented papaya leaf being able to give a better growth because of the nutrient content is quite high and contains the proteolytic enzyme, papain (protein solver). According to Bidura et al. (2008) the papain enzyme can help solve complex protein bonds in the feed so it is easily absorbed in the body of livestock. In addition, the existence of effective microbes in the fermented papaya leaf can serve as a probiotic can improve health and digestibility of feed so that the growth of the ducks to be better. The results of this study in accordance with Siti (2013) that supplementation of papaya leaf flour can enhance the performance of males bali duck. Next, Kanyinji (2014) reported that replacement of soy flour with 2%-6% of the papaya leaf flour can increase the final body weight of the quails.

The final body weight is associated with body weight gain.The highest body weight gain (1274.19 g) found in the treatment T1, followed by T2 (1267.24 g) and T0 (1244.09 g), but statistically not significant different (P>0.05). This is in line with the increasing of feed consumption on those treatments, where the highest feed consumption was on treatment T1. The results of this study reflect that enzymes papain and other enzymes in papaya leaf can help the digestion of feed nutrients so that the growth of ducks is the best. As reported by Kiha et al. (2012), that the enzymes papain, lipase and kimopapain can help solving the nutrients thus increasing feed digestibility and efficiency use of nutrients. Similar results were also obtained by Sukmawati et. al (2015), that giving fermented papaya leaves juice at the level 8-16% no significantly effect on the increasing of body weight gain of kampong chicken aged 4-12 weeks.

Feed efficiency is determined by feed conversion ratio (FCR) value. FCR value in this research ranged from 5.19-5.55 and statistically no significantly difference (P>0.05). This result reflects that fermented papaya leaf waste at the level of 5-10 % is still eligible for ducks because it could decresed the feed cost and capable of producing higher final body weights although statistically no significantly difference. The results of this study in accordance with Unigwe (2014) that the administration of 5%-15% of papaya leaf flour has no effect on FCR values of broiler chickens.

Fermented papaya leaf waste have a good effect on blood lipids profile of female bali ducks because it could decresed blood cholesterol, blood triglyceride and LDL, as well as increased blood HDL (Figure 3). Supplementation of 5% (T1) and 10% (T2) fermented papaya leaf waste could reduce blood cholesterol respectively of 1.44% and 3.59% but statistically not significant different (P>0.05). This result was different with Siti (2013) who found that administration of 2-6% papaya leaf meal in diets significantly reduced total blood cholesterol.

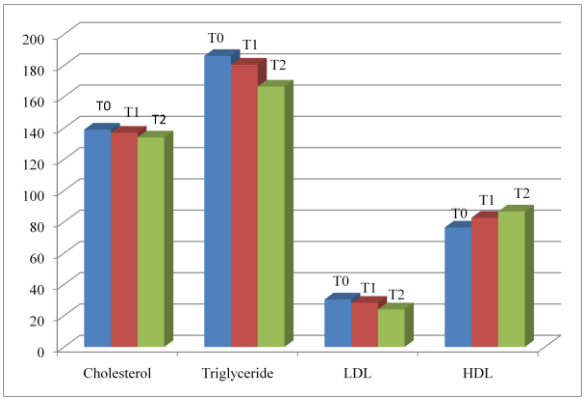

Figure 3. Blood lipids profile of female bali ducks fed 0%(T0), 5% (T1) and 10% (T2) fermented papaya leaf waste.

Decreasing of the cholesterol level is due to the existence of effective microbes in the fermented papaya leaf which can assimilate or binding cholesterol of the intestine during its growth so that cholesterol can not be absorbed into the blood stream.

In addition, the microbes can effectively improve the digestibility of rough fiber in the ration into products of fatty acids, namely acetic, propionic and butyric. Fatty acids, particularly the propionic acid is able to inhibit the synthesis of cholesterol in the liver by inhibiting the enzyme activity path of 3-Hydroxy-3-methyl glutaril CoA reductase, which is very important in the synthesis of cholesterol in the liver. Beside of the effective microorganism, the reducing of blood cholesterol and other lipids (triglyceride and LDL) also caused by high crude fiber contain in papaya leaf. The crude fiber would bind the lipids and bile acid and throw out from the body with faeces, so it would reduce the absorption in the digestive tract. Bile is one way of cholesterol elimination from the body because cholesterol is precursor of bile synthesis.

The improvement of crude fiber in treatment T1 and T2 (Table 1) significantly ($P<0.05$) reduced blood triglyceride level respectively of 2.98% and 10,53%. Triglyceride is one kind of lipids that synthesis in the liver from lipid and starch in diets, so the existence is depend on the absorption in the digestive tract.

LDL (high dencity lippoprotein) and HDL (low dencity lippoprotein) is a compound that belongs to the complex lipid that called lipoprotein. The function of LDL is carries cholesterol and phospholipids to various body tissues for the synthesis of cell membrane, while the HDL transports cholesterol from body tissue to liver. High levels of HDL are associated with resistance to atherosclerosis disease. HDL levels in this studies ranged between 76,40-86.65 dl/100 ml while LDL range between 24,05-30,38 dl/ml. The statistical analysis showed that the fermented papaya leaf supplementation in the diets significantly ($P<0.05$) increased the levels of HDL and decreased blood LDL of females Bali ducks aged 10 weeks. Fermented papaya leaf waste supplementation as much as 5% significantly ($P>0.05$) increased blood HDL levels of 8.18% but haven't been able to decreased blood LDL levels. Whereas, in the giving of 10% are able to raise HDL of 13.42% and reduced LDL blood of 20.84%. The results of this study in accordance with Siti (2013 that giving papaya leaf flour at level 2-6% able to decrease blood cholesterol, triglyseride, LDL and increase HDL of males bali duck. Next, Zetina (2015) reported that the *C. papaya* extract produced a significant decrease of serum and liver cholesterol concentrations, decreased LDL-C and increase HDL serum of rats fed a high cholesterol feeding.

CONCLUSION

Based on the results, it can be concluded that fermented papaya leaf waste in the diets at the level of 5-10% could increased feed consumption and HDL, decreased blood triglyseride and LDL, but not affect on water consumption, body weight gain, last body weight, FCR and blood cholesterol of female bali ducks.

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