BLOOD AND MEAT CHOLESTEROL LEVELS OF MALE BALI DUCK WHICH GIVEN COMMERCIAL RATION SUPPLEMENTED WITH PAPAYA LEAF (*Carica papaya* L) MEAL

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ABSTRACT

An experiment was carried out to study the levels of blood and meat cholesterol of male bali duck fed commercial diets supplemented papaya leaf (*Carica papaya* L) meal, in the Bali Provincial Laboratory. The design was completely randomized design (CRD) with 4 treatments and 5 replications. The fourth treatment were100 % commercial ration without papaya leaf meal (A) ; 98% commercial ration supplemented 2% papaya leaf meal (B) ; 96% commercial ration supplemented 4 % papaya leaf meal (C) and 94 % commercial ration supplemented 6 % papaya leaf meal (D). The variables measured were total cholesterol, triglycerides, LDL and HDL blood and meat of male bali duck. The results showed that papaya leaf meal supplemented in the commercial ration from 2-6 % can significantly reduced total cholesterol, triglycerides and LDL, and increased HDL blood and meat of male bali duck. From the results of this study it be concluded that papaya leaf meal supplemented in commercial ration 2-6 % can reduced total cholesterol, triglycerides and LDL, and increased HDL blood and meat of male bali duck.

Keywords : papaya leaf meal, total cholesterol, triglycerides, LDL, HDL, male bali ducks

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INTRODUCTION

Improved nutrition through the consumption of animal protein is one of the people's demands for health . Appropriate national standards , protein consumption per capita/day is composed of 55 g % (44 g) and 20 % vegetable protein (11 g) were divided into animal protein from fish origin 6.5 g protein and 4.5 g of protein of animal origin . According Sutarwi (2011) level of protein consumption in Indonesia reached 5.45 g/capita/day, equivalent to 21.23 g meat ; 43.73 g egg, and 18.96 g of milk . This figure is below the standard recommended by the Food and Agriculture Organization (FAO), which is as much as 6 g/capita/day. This is a challenge livestock sub-sector in the provision of animal protein for the Indonesian nation . One attempt to meet the needs of animal origin protein is by developing the potential of local livestock, such as male bali duck.

Duck meat on the market or provided by some restaurants, mostly from young male ducks or ducks culled females, so that the physical quality of the meat is not good as, high fat, coarse texture, tough meat with a distinctive aroma, which smells rancid . Soeparno (1992), suggests that consumer preferences for meat are determined by tenderness, color and aroma *flafour* or the meat. According Ismoyowati and Widiyastuti (2003) tegal fat content of duck meat was 4.77 % and cholesterol levels are 188.41 mg/100g. According to Guyton (1987) would be dangerous if the cholesterol in the blood exceeds the normal limit, because cholesterol is one of the causes blockage of the arteries (*atherosclerosis*). United States Department of Agriculture (USDA). 1985 recommend, cholesterol consumption for children around 250 mg/day, whereas for adults lesst han 300mg/day. Seeing the reality of society, especially the

middle class, began to reduce the consumption of meat and other animal protein . This phenomenon is a condition of a dilemma for the government in realizing self-sufficiency in meat by 2014. To overcome the above , it is necessary to find a feed ingredient that can lower cholesterol levels duck meat. Various materials can be used to lower cholesterol meat, one of which is the papaya leaves.

Muljana (2002) informed papaya leaves can be used as a cure malaria , stomach cramps, stimulate appetite and cure beri beri. Duke (1983) states that in 100 g of papaya leaf contains niacin 2.1 mg , vitamin C 140 mg , vitamin E 136 mg and 11,565 mg of beta-carotene. Active component of beta-carotene pro - vitamin A) in papaya leaves can lower cholesterol and as an anti- oxidant (Anwar , 2008). Azmi *et al* . (2012) papaya leaves contain *saponins* from 1.12 to 1.975 mg . Dilamarta (2003) seated, that *saponins* can increased the production and secretion of bile, bile solid particles to increase the issued and expedite fat metabolism that can lower blood triglycerides. Citrawidi *et al* . (2012) found that soaking ration with papaya leaf extract 30 % are not real can lower blood cholesterol and total fat content, but lower feed intake and body weight gain of broilers . Sutarpa (2008) reported that the use 2-3 % of papaya leaves in the diet can lower serum cholesterol and egg cholesterol and improve egg yolk index. Aim of this study is to determine the effect of papaya leaf meal supplemented on blood and meat cholesterol of male bali duck

MATERIALS AND METHODS

Ducks and Rations

One hundred male bali ducks of 5 days from hatching ducks I Wayan Karwa at Kediri Tabanan. Ducks were caged individuals who furnished the feeding and drinking . During the 12 weeks of the study, ducks were given a commercial ration and water was given *ad libitum*. Composition and nutrient content are presented in Table 1. Old papaya leaves cut into pieces $\pm$1-3 cm dried under the sun, then ground and sifted into meal.

Variables and Research Design

Variables measured were : (1) feed intake (g/head/12 weeks), calculated each week, by reducing the amount of feed given to the rest of the ration for one week, crude fiber consumption is calculated by multiplying the feed consumption with crude fiber content, (2) Measurement of cholesterol using the Liebermann-*Burchad*, HDL with methods *Phosphotungstic* acid/magnesium chloride, triglycerides by enzymatic methods and LDL *calori metry* test work program following the Roche (1994).

The design used was a completely randomized design (CRD) with four treatments and five replications . The fourth treatment is : 100% commercial ration/ no papaya leaf meal (A) ; 98% commercial ration + 2% papaya leaf meal (B) ; 96% commercial ration + 4 % papaya leaf meal (C) and 94% commercial ration + 6% papaya leaf meal (D). Each test using five male bali ducks.

Data analysis

Data were analyzed using analysis of variance. If the results are significantly different ($P < 0.05$), followed by analysis of the multiple range test of Duncan`s (Steel and Torrie, 1991)

Tabel 1. Composition and Nutrient Content of The Ration

Nutrient Content (%)	Treatments			
	A	B	C	D
Commersial Ration	100	98	96	94
Papaya leaf meal	-	2	4	6
Total	100	100	100	100

Nutrient Content	Papaya leaf	Treatments Ration				Standard
		A	B	C	D	
Dry matter (%)**	88,85	87,89	87,91	87,93	87,95	-
Crude protein (%)	16,77 *	20,51	20,44	20,36	20,29	18
Ash (%) **	15,99	5,90	6,10	6,30	6,51	-
Crude fiber (%)**	12,94	5,0	5,16	5,32	5,48	5-7
Calcium (%) **	2,0	0,9	0,92	0,94	0,98	0,9-1,2
Phosphorus (%) **	0,41	0,6	0,59	0,59	0,59	0,4
Gross Energy (Kkal/g) **	3.301	3.799	3.789	3.779	3.769	-

A = 100% commercial ration; B = 98% commercial ration supplemented 2% papaya leaves meal; C = 96% commercial ration supplemented 4% papaya leaves meal and D = 94% commercial ration supplemented 6% papaya leaves meal

* = Widyaningrum 2003

** = Proximate analysis result the nutrition and food laboratory of Animal Husbandry Udayana University, on December 2012

Standard Farrel1995

RESULTS AND DISCUSSION

Statistically the average feed consumption in the four treatment showed not significant difference (P>0.05). Feed consumption ranged between 7588.50 g/head/12 weeks - 7714.24 g/head/12 weeks (Table 2). This is caused by the nutrient content of the ration on the fourth treatment is almost the same . The results of this study together with the results obtained by Rukmini (2006) , that the provision of papaya extract on the level of 3 % in the drinking water had no effect on feed intake male bali ducks age 3-11 weeks. Sudjatinah *et al* (2005) obtain, that papaya leaf extract at the level of 0%, 0.5 %, 1.5% and 2.5% in the drinking water did not significantly affect feed intake, water intake, body weight gain and feed conversion of broiler chickens aged 0-21 days.

The average consumption of crude fiber in treatment A is 385.71 g/head/12 weeks, markedly lower (P<0.05) from treatments C and D, respectively 4.93 % and 7.81%. This is due to the crude fiber content of the ration on treatments C and D are higher. These results are consistent with the results of the study Kiha *et al* (2012), that the increased consumption of crude fiber in the ration, marinated with papaya leaf extract 30%.

Table 2 that papaya leaf meal supplemented on commercial ration 2-6% can reduced total cholesterol, triglycerides and LDL, increased blood and meat HDL male bali duck aged 12 weeks.

Total blood cholesterol A treatment was 186.2 mg/dl. Total blood cholesterol in treatment B, C and D significantly (P<0.05) lower, respectively 12.99%, 23.38% and 35.84% compared with treatment A. Total blood cholesterol on D treatment significantly (P<0.05) lower than treatment B and C, respectively 35.59% and 19.41%. Total blood cholesterol at C treatment significantly (P<0.05) lower 13.55% of treatment B. This is caused by the consumption of crude fiber in treatments B, C and D were significantly higher than treatment A. Crude fiber can bind fat is then removed through the stool, so that the fat content of meat and fat levels decreased sub cuttaneus. Decrease in total cholesterol might also be caused by the papaya leaf meal contains Vitamin A 18.250 IU (Duke , 2009) . According to Sweetman (2007) the active component of beta -carotene can inhibit lipid oxidation and Low Density Lipoprotein (LDL). Inhibition of lipid oxidation processes leading to inhibition of the formation of acetyl- Co- A as an early precursor of cholesterol biosynthesis in the liver, so it is transferred to the serum cholesterol will decrease . Active component of beta -carotene in papaya leaves can lower cholesterol (Anwar, 2008). This result is consistent with the results obtained Sutarpa (2008) use of papaya leaf powder 2-3% in the diet can lower serum cholesterol and cholesterol eggs, and yolk color index increases chicken . But the result is in contrast to the results of research Citrawidi *et al* . (2012) , that the ripening of papaya leaf extract ration with 30% no significant effect on lowering blood cholesterol and total fat content, but lower feed intake and body weight gain.

Content of triglycerides in the blood of the four treatments showed statistically significant differences (P< 0,05). Blood triglyceride A treatment was 189.69 mg / dl. Blood triglycerides in treatment B, C and D significantly (P<0.05) lower than treatment A, respectively 33.40%, 36.21% and 44.83% . Blood triglycerides in B and C treatment significantly (P<0.05) higher, respectively 17.15% and 13.50% of the D treatment. This is caused by the consumption of crude fiber in B, C and D treatments are higher than A treatment. Crude fiber is able to bind fat removed through the feces, resulting in sub-cutaneous fat content decreased. Triglycerides formed in liver from lipid or carbohydrate foods and stored as fat under the skin and other organs. Azmi *et al*. (2012) levels of *saponin* in the leaves of papaya is 1.12 to 1.98 . Dalimartha (2003) found that *saponins* can increase the production and secretion of bile, bile solid particles to increase the issued and expedite fat metabolism that can lower blood triglycerides.

Blood HDL levels increased on addition of papaya leaf meal in the ration . The higher level of papaya leaf meal increased blood HDL levels. HDL levels in the D treatment significantly (P<0.05) higher than A, B, and C treatments, respectively 18.96%, 16.99%, and 11.33% . Function of HDL and LDL opposites. LDL cholesterol is sent by the network to the coronary vessels backfilled. So LDL is atherogenic because it causes calcification of coronary arteries. Other wise HDL actually be preventing calcification , by way of siphoning deposits of cholesterol in the liver tissue was then sent to the next thrown into the bile. Increase in HDL in B, C and D treatment is a normal physiological balance, if LDL levels down, then HDL levels go up.

Results of analysis of variance showed blood LDL levels in the four treatments showed significant differences (P<0,05). LDL levels on A treatment was 76.4 mg/dl. LDL levels on treatment D significantly (P<0.05) lower than treatment A, B and C. Low density lipoprotein (LDL) lipoproteins which are deposited into the network if high concentration is a potential form of atherosclerosis. Concentration of LDL in the blood is influenced by food. Pattern opposite to the concentration in the blood levels of HDL. Decrease in LDL levels on treatment B, C and D are caused by the consumption of crude fiber increased. Because bile acids bound in part by the fiber, the catabolism of LDL levels in the blood increases and decreases. Decrease in LDL levels

also caused by papaya leaf meal contains anti- oxidants such as vitamin A, vitamin E, which can inhibit HMG - Co-A working, so that the formation of *mevalonic* acid which causes reduced blood cholesterol decreased.

Table 2. Feed intake, Cholesterol, Triglycerides, LDL, HDL Blood and Meat of Male Bali Duck aged 12 Weeks Which Given Commercial Ration Supplemented With Papaya Leaf Meal

Variable	Treatments				SEM
	A	B	C	D	
Feed Consumption (g/head/12 Weeks)	7.714,24 a	7.642,82 a	7.607,16 a	7.588,50 a	53,33
Crude fiber Consumption (g/head/12 Weeks)	385,71	394,37	404,71	415,85	3,55
- Blood Cholesterol (mg/dl)	186,20 a	162,00 b	142,67 c	119,47 d	2,75
- Blood HDL (mg/dl)	65,80 b	67,40 b	72,00 b	81,20 a	2,56
- Blood LDL (mg/dl)	76,40 a	69,00 a	54,00 b	34,00 c	3,17
- Blood Triglycerides (mg/dl)	189,69 a	126,33 b	121,00b	104,66 c	3,01
- Meat Cholesterol (mg/dg)	146,00 a	114,00 b	103,78 c	81,32 d	2,11
- Meat HDL (mg/dg)	43,40 b	43,60 ab	46,08 ab	47,38 a	4,93
- Meat LDL (mg/dg)	69,74 a	50,48 b	39,16 c	28,58 d	1,21
- Meat Triglycerides (mg/dg)	122,40 a	105,60 b	97,00 bc	88,40 c	4,93

Keterangan :
A = Commercial ration 100%; B = commercial ration 98% + 2% papaya leaf meal;
C = commercial ration 96% + 4% papaya leaf meal and D = commercial ration 94% + 6% papaya leaf meal
SEM = Standard Error of the Treatment Means
Different letters in the same row indicate significant differences ($P < 0,05$)

Meat lipid profile include total cholesterol, triglycerides, LDL decreased following the pattern of blood lipid profile while increasing HDL levels. Total cholesterol, triglycerides and LDL real meat ($P<0.05$) lower in receiving rations of flour papaya leaves. But HDL levels increased significantly ($P<0.05$) in the diet containing papaya leaf meal.

Total cholesterol of meat on A treatment was 146.00 mg/dg. Total cholesterol in B, C and D treatment significantly ($P<0.05$) lower, respectively 21.92%, 28.92% and 44.52%. This is caused by the consumption of crude fiber in treatments B, C and D are higher than treatment A. Fiber can reduced the absorption of fat in the intestine that can lower cholesterol. Evident from the thick intestine gets treatment B, C and D are thinner than treatment A. Mechanisms of

cholesterol-lowering fiber in which fiber foods delay gastric emptying resulting in reduced caloric intake. Fiber will bind fat so impaired fat absorption. Fiber will bind *kenodeoksilat* acid will inhibit the enzyme HMG - CoA *reductase* that cholesterol synthesis is inhibited. Fiber also binds bile acids and form micelles which are excreted in the feces (Claudia and Enny, 2012). It was also mentioned that papaya leaf contains antioxidants such as vitamin C, vitamin A, and vitamin E. Vitamin C is one antioxidant that has anti - *atherogenic* properties that serve to reduce the oxidation of cholesterol. Vitamin C is a water soluble antioxidant that is very effective in blood plasma. Vitamin C contained in papaya leaves can help hydroxylation reactions in the formation of bile acids which can increase excretion of cholesterol in the body so that it can lower cholesterol meat. This result is in contrast to the results of research Citrawidi *et al*. (2012) that the curing of a commercial ration with papaya leaf extract 30% did not significantly affect the levels of fat and decrease blood cholesterol levels, but significantly reduced consumption and body weight gain of broiler.

Meat triglyceride levels following blood triglyceride levels, namely papaya leaf meal supplemented in the diet can reduce levels of triglycerides meat. Meat triglyceride levels in treatment A was 122.40 mg/dg. Meat triglyceride levels in treatment B, C and D significantly ($P<0.05$) lower, respectively 13.73%, 20.75% and 27.78%. Cholesterol and triglycerides are contained in food will directly affect blood cholesterol and triglyceride levels as well as meat. However, HDL and LDL are not derived from the feed directly, because both lipoproteins are synthesized in the body. Decrease in triglyceride levels in treatments B, C and D are caused by the consumption of fiber roughness higher than treatment A. Dietary fiber delay gastric emptying resulting in reduced caloric intake. Fiber will bind fat so impaired fat absorption. Triglycerides are a form of glycerol esters of three fatty acids and glycerol. Triglycerides formed in liver from lipid or carbohydrate foods and stored as fat under the skin and other organs.

HDL levels in the meat ration was given papaya leaf powder increased following the pattern of blood HDL levels. HDL levels of meat on treatment A was 43.40 mg/dg. HDL real meat on treatment D ($P<0.05$) higher 8.40% of treatment A. However, HDL levels in treatment D was not significant ($P>0.05$) higher than treatment B and C, respectively 2.74% and 7.98%. Function of HDL and LDL opposites. LDL cholesterol is sent by the network to the coronary arteries and backfilled. So LDL is *atherogenic* because it causes calcification of coronary arteries. Other wise HDL actually be preventing calcification, by way of siphoning deposits of cholesterol in the liver tissue was then sent to the next thrown into the bile. Increased in HDL is a normal physiological balance, if LDL levels down, then HDL levels go up .

Results of analysis of variance showed that meat LDL levels in the ration supplemented papaya leaf meal markedly lower than treatment A (feed without papaya leaf meal), following the pattern of blood LDL levels. Decrease in LDL levels on treatment B, C and D are caused by the consumption of crude fiber increased. Because bile acids bound in part by the fiber, the catabolism of LDL levels in the blood increases and decreases. Decrease in LDL levels also caused by papaya leaves contain antioxidants such as vitamin A, vitamin E and vitamin C can inhibit the formation of HMG - Co-A, so the formation of *mevalonic* acid decreases causing decreased cholesterol meat .

CONCLUSION

Based on the results of this experiment in can be concluded that papaya leaf meal supplemented in commercial ration 2-6 % caned reduce total cholesterol, triglycerides, LDL and increased blood and meat HDL male bali duck.

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