Rice bran fermentation technology and soya bean oil supplementation of transfer protection fatty acid Omega-3 of unsaturated and saturated fatty acids content of milk dairy cow

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ABSTRACT: The experiment was conducted to investigate the effect of rice bran fermentation technology and soya bean oil supplementation of transfer protection fatty acid omega-3 of content fatty acids unsaturated, saturated and arachidoneic acid of dairy milk. In total, 12 female *Peranakan* Frisian Holstein (PFH) dairy cows of 5-6 years old with body weight of 300-375 kg were used in this experiment. The assay diets included of basal diet (control) based on king grass, *onggok*, rice bran, soy bean meal and coconut meal alone, tuna fish oil and *lemuru* fish oil. The method of the research was experimental in vivo using Completely Randomized Blok Design (CRDB). There were 5 treatments in each treatment and two replications. Treatments consisted of P_0= control ration, P_1=P_0 +20% fermentation rice bran for substitution of use rice bran of concentrate, P_2=P_1 +soya bean oil, P_3=P_1 + Tuna fish oil soap protection 5 ml or equal with 4% in the ration, and P_4=P_1+ *lemuru* fish oil soap protection 5 ml or equal with 4% in the ration. The variables measured were composition of dairy milk cows. The results showed that the effect of supplementation of tuna fish oil and *lemuru* fish oil soap protectied in the rations contain 20% rice bran fermentation has significantly effect ($P<0.01$) on acid cows milk concentration. The conclusion of this research showed that the supplementation of 5 ml that was equal to 4% tuna and *lemuru* fish oil in cows rations can decrease milk LDL from 38.38 to 31.24 mg/dl, fat from 3.823% to 3.640%, increased unsaturated fatty acid from 41.12% to 72.56%,EPA from 0.66% to 1.90%, DHA from 0.04% to 1.32% and decrease saturated fatty acid from 58.88% to 27.44%.

Key words: composition dairy milk, protected fatty acids, *tuna* fish oil, *lemuru* fish oils

INTRODUCTION

Increasing the awareness of the fortunate society upon good quality food has increased the demand of low fat, low cholesterol and high content of omega-3 polyunsaturated fatty acids, particularly eicosapentaenoic acids (EPA) and docosahexaenoic acids (DHA). Milk product of dairy cows that highly contain omega-3, omega-6 fatty acids and low cholesterol of new through for resulted animal product good quality. It can be done by manipulating the ration. Tuna fish oil of rubbish this analysis finished metabolism energy content 5600 cal/kg and content lipid four percent. It is omega-3 fatty acids especially eicosapentaenoic acids (EPA) 24,85 percent and docosahexaenoic acids (DHA) 28,59 percent (Sudibya et al., 2004).

Sudibya *et al.* (1998) reported that function of omega-3 fatty acids was reducing cholesterol content through two methods 1) increasing cholesterol excretion through empedal from liver to in intestine and 2) To concencuence cholesterol catabolism from high density lipoprotein to the liver and converse it to bile acids, which will not be regenerated and voided out with the excreta.

Problem solving above this research important with title "Rice Bran Fermentation Tecnology and Soya Bean Oil Suplementation of Transfer Protection Fatty acid Omega-3 of Conten Unsaturated Fatty Acids and Saturated of Milk Dairy Cow". The objective of this study to know interaction between rice bran fermentation and tuna or fish oil of protect in the ration to reduce content cholesterol and increase omega-3, omega-6 fatty acids.

Advantage research can useful as material standard source of composition ration cows special. The healthy can reduce artero-sclerosis, cancer, tumor, diabetes desease and to increasing antibody.

MATERIALS AND METHODS

Animal and Housing

A total of 10 post weaned female dairy cow of *Peranakan* Frisien Holstein(PFH) (300 to 375 kg bodyweight). The dairy cows were individually housed (4 x5 m).

Dietary Treatments and Experimental Design

The basal diet consisted of king grass, yellow corn, rice bran, soy bean meal, coconut meal and mineral premix. The diet was formulated to meet the requirements for dairy from 300 to 375 kg of body weight. The basal diet was fed alone or use rice bran substitution of pure rice bran, +5 ml (equal to 4% in the diet) tuna fish oil soap protection, + 5ml (equal to 4% in the diet) *lemuru* fish oil soap protection. The basal diet was defined as control treatment. The residual 3 assay diets were referred to as tuna and *lemuru* treatment it was obtained from Tuna and *lemuru* fish oil soap protection and used as the sources of omega-3. The experiment was conducted as Completely Randomized Block Design with 5 treatments and 2 blocks, each with 1 dairy cows (n=1 observations =5 per treatment). The experimental diets were fed ad libitum for 12 weeks. The samples were stored 0^0C until it was analysed. Sub samples of fresh milk were taken and were cooked.

Chemical Analysis

Determination of saturated and unsaturated fatty acid in milk was performed as outlined by AOAC (1990). The omega-9 fatty acid analysis of milk was performed according to the procedure described by AOAC (1990).

Statistical Analysis

The study was conducted as a Randomized Completely Block Design (RAK) with 4 dietary treatments and 2 blocks, with 1 dairy per block. The following linier model was considered $Y_{ij=}\mu + \rho + \alpha i + \varepsilon_{ij}$ where Yij=J^{th} measurement in i^{th} treatments on j^{th} animal, μ=general term, ρ=effect of block, αi= effect of i^{th} treatments, ε_{ij} =error associated with $Y_{ij.}$ The data were analyzed for analyses of variance (ANOVA) and were continued with orthogonal contrast test (Steel and Torrie, 1980).

Parameter Analysis

-Conten LDL,HDL and content lipid of dairy milk.
-Conten saturated fatty acid and unsaturated of dairy milk.
-Sosialision cunsumsion dairy milk obtained omega-3 and low cholesterol of SDN Children one class and two class at village Gledeg district Karanganom, Klaten regency.

RESULTS AND DISCUSSION

Lipids Content of Cow Dairy Milk

Low lipids contents of dairy milk was found on the P_4, it was 3.340 %, whereas the highest contents was treatmen P_0 namely 4.023%, as presented in Table 1.

Statistical analysis of orthogonal contrast showed that lipid contents of P_0 was significantly different with P_3 and P_4; P_1 and P_2 was significantly different with P_3 and P_4, whereas between P_3 and P_4 did not differ significantly. Concentration of lipids did not significant between P_2 and P_1. Sudibya et al. (2009) report that supplementation of soya bean oil can not decrease the lipid content of dairy milk.

Suplementation with *lemuru* fish oil on the soap protection and tuna can decrease the content of lipids, because fish oil energy source and the source of unsaturated fatty acids contents, it can

decrease the lipids content of dairy milks. Suarez et al. (1996) reported that unsaturated supplementation in the ration can decrease the content of lipids in the body. Non significant different between P_3 and P_4, could be caused by *lemuru* fish oil contents has the same quality as tuna fish oil therefore it does not significant influence.

Table 1. Average concentration of lipids, LDL, HDL, unsaturated and saturated fatty acid of cows dairy milk

Treatments	Parameter				
	Lipids (%)	LDL (mg/dl)	HDL (mg/dl)	Unsaturated (%)	Saturated (%)
P_0	4.023[a]	37.38[a]	62.62[a]	44.89[a]	55.11[a]
P_1	3.823[a]	36.28[a]	63.72[a]	46.54[a]	53.46[a]
P_2	4.016[a]	36.27[a]	63.73[a]	46.55[a]	53.45[a]
P_3	3.366[b]	25.19[b]	74.81[b]	71.53[b]	27.47[b]
P_4	3.340[b]	25.15[b]	74.85[b]	72.29[b]	27.71[b]

[ab]Means with different superscripts in the same column are significantly different (P<0.01).

Low Density Lipoprotein (LDL) Contents of Cow Dairy Milk

Content of LDL is presented in Table 1. The lowest LDL content of dairy milk was dound on P_4, it was 25.15 mg per dl , whereas the highest content was in P_0 namely 37.38 mg per dl. The statistical analysis of orthogonal contras showed that content of LDL in P_0 was significantly different with P_3 and P_4. The significant differences was also identified at P_1 and P_2 treatments compared to P_3 and P_4, whereas between P_3 and P_4 no significant differences was found. Concentration of LDL did not significantly differ between P_2 and P_1. Sudibya et al. (2009) reported that supplementation of soya bean oil can not decrease the content of LDL dairy milk.

Suplementation of *lemuru* fish oil under soap protection and tuna would able to decrease the content of LDL, because fish oil energy source and content of unsaturated fatty acids, therefore it can be used to decrease the content of LDL dairy milk. Komari (1994) and Layne et al. or Sinclair (1996) report ed that supplementation of unsaturated in the ration can decrease content of LDL in the experimental animal body. The non significant different of LDL content for P_3 and P_4 caused by fish oil contents has the same quality as tuna fish oil therefore it does not significant influence.

High Density Lipoprotein (HDL) Contents of Cow Dairy Milk

Content of HDL is presented in **Table 1**. The highest HDL (*High Density Lipoprotein*) content of dairy milk was in treatment P_4 namely 74.85 mg per dl , whereas of the lowest was found on treatment P_0 it was 62.62 mg per dl . Complete data on HDL contents of various treatments is presented in **Table 1**.

Statistic orthogonal contrast analysis showed that content of HDL in P_0 was significantly differ with P_3 and P_4 The content of HDl at P_1 and P_2 was significantly differ with P_3 and P_4, whereas between P_3 and P_4 did not differ significantly, the same result was found between P_2 and P_1. Sudibya et al. (2009) reported that supplementation of soya bean oil can not increase HDL content of dairy milk.

Supplementation of *lemuru* fish oil under soap protection and tuna can increase the content of HDL because fish oil energy source and content unsaturated fatty acids. Komari (1994) and Layne et al. or Sinclair (1996) reported that supplementation of unsaturated in the ration can increase content of HDL in the body of experiment animal.

Unsaturated Fatty Acids Concentration of Dairy milk

Highest concentration of unsaturated fatty acids of cows dairy milk was in P_4 namely 72.29%, whereas the lowest was in treatment P_0 44.89%. Complete data on the concentration of unsaturated fatty acid is presented in **Table 1**.

An orthogonal contrast analysis showed that unsaturated content of P_0 was significantly differ with P_3 and P_4, the same result was found on P_1 and P_2 compared to P_3 and P_4, whereas P_3 did not differ significantly with P_4. The concentration of unsaturated was found non significant between P_2 and P_1. Sudibya et al. (2009) reported that supplementation of soya bean oil can not increase content unsaturated content of dairy milk.

Supplementation of *lemuru* fish oil under soap protection and tuna can increase the content of unsaturated because fish oil energy source and content of unsaturated fatty acids, therefore it will increase content of unsaturated fatty acids on milk. Suarez et al. (1996) reported that supplementation of unsaturated in the ration can increase content of unsaturated fatty acids in the body. The research done by Sudibya et al. (2006; 2007) found that content of unsaturated on beef meat supplemented by *lemuru* fish oil was 69.60% while for mutton which supplemented by *lemuru* fish oil produce 63.37% of *unsaturated fatty acids*. The result of this study indicated that unsaturated fatty acids content of dairy milk under normal condition, it was 72.29%.

Saturated Fatty Acids Concentration of Dairy Milk

Highest content of saturated fatty acids was in P_0 (55.11%), whereas the lowest was in treatment P_4 namely 27.71%.The summary of saturated fatty acid content of milk resulted from this study is presented in **Table 1**.

Statistical analyis of orthogonal contrast showed that content of saturated fatty acid at P_0 was significantly different with P_3 and P_4. The same result was found on P_1 and P_2 compared to P_3 and P_4, whereas non significant different was found between P_3 P_4. Concentration of saturated fatty acid was non significant between P_2 and P_1. Sudibya et al. (2009) reported that supplementation of soya bean oil can not increase content of saturated fatty acid of dairy milk.

Supplementation of *lemuru* fish oil under soap protection and tuna can decrease content of saturated because fish oil energy source and source content of unsaturated fatty acids, therefore it increase content of saturated fatty acids of milks. Suarez et al. (1996) reported that supplementation of unsaturated in the ration can decrease saturated fatty acids content in the body. The research conducted by Sudibya et al. (2006; 2007) found that saturated fatty acid content of beef meat which supplemented by fish oil *lemuru* was 30.50% while for mutton supplemented by *lemuru* fish oil *was* 32.64%. The result of this study indicated that saturated fatty acids content of dairy milk is 27.44% it was normal and healthy for human.

Eikosapentaenoic Acid (EPA) Contents of Cows Dairy Milk

The highest content of EPA fatty acids in dairy milk was found on treatment P_4 (2.08%), whereas the lowest was treatment P_0 (0.86%). The summary of EPA content of milk resulted from this study is presented in **Table 2**. Supplementation of *lemuru* fish oil under soap protection and tuna can increase content EPA, because fish oil energy source and source content of unsaturated fatty acids.

Table 2. Average EPA, DHA and fatty acid concentrations on cow dairy milk

Treatments	Parameter EPA (%)	DHA (%)
P_0	0,86[a]	0,50[a]
P_1	0,89[a]	0,70[a]
P_2	0,90[a]	0,57[a]
P_3	2,07[b]	1,44[b]
P_4	2,08[b]	1,55[b]

[ab]Means with different superscripts in the same column are significantly different (P<0.01).

Orthogonal contrast of statistical analysis showed that content of EPA fatty acids of P_0 was significantly differ with P_3 and P_4, and P_1 versus P_3 and P_4, whereas between P_3 and P_4 was non significant different. The same content of EPA fatty acids was found between P_1 and P_0. Increasing

content EPA fatty acids in milks, therefore can be done by supplementation of *lemuru* and tuna fish oil in the ration. Suarez et al. (1996) reported that supplementation of unsaturated in the ration can increase content of EPA fatty acids in the body. The research done by Sudibya et al. (2006; 2007) reported that content of saturated on beef meat supplemented with *lemuru* fish oil *was* 3.02% while for mutton was 3.17%. The result of this study indicated that saturated fatty acids content of dairy milk under normal condition, it was 1.90%.

Dokosahesaenoic Acid (DHA) Contents of Cow Dairy Milk

The highest dairy milks content of DHA fatty acids was found on treatment P_4 (1.55%) and the lowest was in treatment P_0 (0.50%). The DHA content of cows dairy milk is presented in **Table 2**.

Supplementation of *lemuru* fish oil under soap protection and tuna can increase DHA content, because fish oil energy source and source content of unsaturated fatty acids.

The result of orthogonal contrast analysis showed that content of DHA fatty acids of treatment P_0 significantly different with P_3 and P_4, the same result was found for P_1 compared to P_3 and P_4, whereas P_3 was not significant different with P_4. Content DHA fatty acids of treatment P_1 was the same as treatment P_0.

Suarez et al. (1996) reported that supplementation of unsaturated in the ration can increase content of DHA fatty acids in the body. The research conducted by Sudibya et al. (2006; 2007) found that content of saturated on beef meat supplemented with *lemuru* fish oil on their ration was 2.40% while goats meat which supplemented with *lemuru* fish oil mon their ration was 2.41%. The research content DHA fatty acids dairy milk it is 1,55 percen that is normal.

CONCLUSIONS

Supplementation of 5 ml that was equal to 4% of tuna and *lemuru* fish oil under soap protection in the cows rations with basal diets of rice bran fermentation can decrease the content of cholesterol from 0.186% to 0.124%, LDL from 37,38 to 25,15 mg/dl, fat from 4.023% to 3,340% and increase omega-3 fatty acid from 0.903% to 3.87 %; omega-6 fatty acid from 0.55% to 20.63%; unsaturated fatty acid from 44.89% to 72.29%. The supplementation was also increase EPA concentration from 0.86% to 2.08%; DHA from 0.50% to 1.55%, in contrast, it was decreased the contents of saturated fatty acid from 55.11 % to 27.71%.Tuna fish oil and *lemuru* fish oil under soap protection can be supplemented in dairy cows ration fed with rice bran fermentation basal diet as much as 5 ml which is equal to 4%.

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