SUMMARY

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The purpose of the study wanted to make formula feeding catlle and examines rich in omega-3 fatty acids and low in cholesterol through supplementation of L-carnitine and soap extract of tuna fish oil and fish oil lemuru protected. The next objective assess cholesterol levels and omega-3 fatty acids of rich. Using the experimental method with randomized block design (RAK) with 5 treatments with 2 blocks as replications. Each unit contains 1 block rams. The used was suplementation L-carnitine of 250 ppm and protection tuna or lemuru fish oil to reduce of meat catlle cholesterol from 141.10% to 113.80% and LDL of meet from 42.05 mg/dl to 35.80 mg/dl and lipid of meet from 4.55% to 4.20 percent.Furthermore to increase HDL (high density lipoprotein) from 57.95 mg/dl to 64.20 mg/dl. Suplementation protection tuna or lemuru fish oil in the ration 250 ppm l-karnitin to increased the omega-3 fatty acids of meet from 4.85% to 6.46%, omega-6 fatty acid from 23.28% to 30.64%, fatty acids polyunsaturated of meet from 62.40% to 70.22% and EPA from 2.49% to 3.22% then DHA from 1.95% to 2.71%. There for reduction of fatty acids saturated of meet from 37.60% to 29.78 percent and increase number peroksida from 0,1309 to 0,2504 miliequivalen/kg and number TBA from 1,3037 to 1,6257 mg/kg on the meat catlle.

Keywords: Cholesterol, fatty acids linolenic, linoleic, arachidonic, L-carnitine and tuna fish oil

Protected lemuru

INTRODUCTION

Background

Make catlle meat products are rich in omega-3 fatty acids and 6 and low in cholesterol is a breakthrough to produce a healthy animal products. These products can be made by manipulating the soap supplementation protected with extracts containing omega-3 fatty acids through the ration that is mixed in rations that use of fermented cassava. Fermentation of feed materials in general can increase the nutritional value especially protein content, this is a result of activity of catabolic enzymes produced by microorganisms (Winarno and Fardiaz, 1973). Further fermentation with Rhizopus oligosporus produces lipase enzyme which can break down fatty acids into energy, so that the fat content will drop. Fat content down to 20%, while palmitic acid, oleic, linoleic and linolenic fatty compounds released from the chain (Kasmidjo, 1989). Furthermore it is stated that the fermentation process resulted in rising levels of dissolved nitrogen from 0.5% to 2% and free amino acid levels also increased to 85 times, but their amino acid composition is relatively stable

Research on catlle meat products rich in omega-3 fatty acids has not been revealed, but as a foothold in beef cattle have been done by Sudibya et al. (2003) which continued in the year (2006), in the year (2007) on goat and cattle year (2010) on dairy cow milk the result is very significant and therefore if the method is applied to the sheep its impact will be the same becauseit is still included in ruminants. Sources of omega-3 fatty acids often found in marine fish, mainly lemuru, tuna and shark. Lemuru when pressed will generate a lot of fish oil containing omega-3 fatty acids especially EPA (eicosapentaenoic) 34.17% and DHA (docosahexaenoic) as much as 17.40 percent and fat content of 6% and TDN 182 kcal / kg fish oil was Tuna when pressed will generate a lot of fish oil containing omega-3 fatty acids especially EPA (eicosapentaenoic) 33.6 to 44.85% and DHA (docosahexaenoic) as much as 14.64% and 5.8% fat and 178 kcal TDN / kg (Sudibya et al. 2004 and 2007). On the basis of differences in content needs to be examined for comparison. Fish oil is a source of fat. Manipulations of fat metabolism in the rumen is intended to produce two of the first particle control antimicrobial effects of fatty acids to minimize disturbance of rumen fermentation, so that the highest fat level can be included in the diet, both control biohidrogenasi to increase the absorption of desired fatty acids to improve the nutritional quality of livestock products (Chillard, 1993). Fish oil supplementation in the diet should be with a particular dose so as not to disrupt the activity of rumen microorganisms. Jenkins (1993) states that the addition of fish oils in ruminant feed should not exceed 6-7% of ration dry matter as it will affect rumen fermentation microorganisms.
Sudibya (1998) functions of omega-3 fatty acids in lowering cholesterol levels in two ways namely 1) stimulates the excretion of cholesterol through the bile from the liver into the intestine and 2) stimulate the catabolism of HDL cholesterol by the liver back into bile acids and not regenerated again but excluded with excreta. Beef catlle meat is usually consumed by humans in a state of cooked (lamb skewers) so we need organoleptic (taste, odor and color) and the content of omega-3 fatty acids whether or not changes as well as fat oxidation products with peroxide levels and the levels of malonaldehyde with TBA test (thiobarbiturat acid).

PROBLEM FORMULATION.

Research on catlle meat products rich in omega-3 fatty acids has not been revealed, but as a foothold in beef cattle have been done by Sudibya et al. (2003) which continued in the year (2006), in the year (2007) on goat and cattle in the year (2010) on dairy cow milk the result is very significant and therefore if the method is applied to the sheep its impact will be the same because it is still included in ruminants.Sources of omega-3 fatty acids often found in marine fish, mainly lemuru, tuna and shark. Lemuru when pressed will generate a lot of fish oil containing omega-3 fatty acids especially EPA (eicosapentaenoic) 34.17% and DHA (docosahexaenoic) as much as 17.40 percent and fat content of 6% and TDN 182 kcal / kg fish oil was Tuna when pressed will generate a lot of fish oil containing omega-3 fatty acids especially EPA (eicosapentaenoic) 33.6 to 44.85% and DHA (docosahexaenoic) as much as 14.64% and 5.8% fat and 178 kcal TDN / kg (Sudibya et al. 2004 and 2007). On the basis of differences in content needs to be examined for comparison.Fish oil is a source of fat. Manipulations of fat metabolism in the rumen is intended to produce two of the first particle control antimicrobial effects of fatty acids to minimize disturbance of rumen fermentation, so that the highest fat level can be included in the diet, both control biohidrogenasi to increase the

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Soap calcium (Ca-soap) is one technology to protect the fat lately been developed. Soap is a form of fat-protected calcium and is an effective source of fat in ruminant feed, as the system remains normal rumen fermentation, digestibility of high fatty acid and soap can easily be mixed with some type of feed material (Jenkins and Palmquist, 1984). Through the method of saponification with calcium salts ($CaCl_2$) is expected to use fat at a high level does not cause negative impact on rumen microbial ecosystem.Sudibya, et al. (2007) states that supplementation with tuna fish oil and fish oil lemuru up to level 5 ml / tail in goat rations containing 50 ppm of L-carnitine can reduce cholesterol levels goat meat from 143.18% to 113.3% and LDL (Low Density Lipoprotein) blood from 42.38 mg / dl to 35.24 mg / dl and fat content of meat from 8.14% to 7.94 percent. Furthermore able to increase levels of HDL (High Density Lipoprotein) goat blood from 57.62 mg / dl to 64.76 mg / dl.

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MATERIALS AND METHODS RESEARCH

a. Time and place of study.This research is experimental research conducted in the area hamlet village Gledeg Gledeg Klaten.dan Country District Karanganom Bogor Institute of Science Laboratory, Chemistry Laboartorium UGM UGM Faculty of Agricultural Technology Laboratory and the Laboratory of Food Nutrition and Agriculture Faculty of Animal Husbandry Prodi UNS Surakarta. Further research was conducted over four months ie from June and ends in September 2010.

bMaterial:

Phase I: Yeast tape, market waste materials and other equipment.

Phase II: fatty acid soap protected. Extracts of omega-3 fatty acids derived from tuna fish oil and fish oil lemuru

Phase III.

Beef catlle weaning off the tail with as many as 10 males weigh 100-150 kg.

-Which has been fermented rubbish market. Soap protected-containing tuna fish oil and fish oil lemuru.

- Cages Tobong one unit for the 10 catlle with a tail length = 25m and width of 8 m

and individual cages 10 units and each unit contains 1 rams off weaning.
- Basic rations in accordance with the treatment

c.Method:
Using a randomized block design (RAK) with 5 treatments each namely

P_0= Control ration,

P_1=P_0 +15% fermentated rubish market for substitution of grass in the ration

P_2=P_1 + L-carnitin 250 ppm in the ration

P_3=P_1 + soap protected fish oil tuna 4% in the ration

P_4=P_1 + soap protected fish oil lemuru 4% in the ration

and using 2 blocks as replications. Each unit contains 1 block off beef catlle. Variables measured are: Cholesterol content of lamb are cooked with the method of Kleiner and Dotti (1962).Fat content of lamb are cooked with the method (AOAC, 2001) LDL (Low Density Lipoprotein) and HDL (High Density Lipoprotein) are cooked mutton with the method (Assman, 1982) Levels of linolenic fatty acid, linoleic acid and unsaturated and saturated fatty catlle are cooked with the method (AOAC, 1990).Data were analyzed with ANOVA and if there are continuing differences orthogonal contrast test (Steel and Torrie, 1980) athematical models used are Yij = μ+αi+ijρ ε (I=1,2,3,4 and 5; j = 1,2 and 3)where Yij = observation on the j-th experimental unit in the ration of fermented rubbish market supplemented tuna oil soap and protected lemuru i

-th=general average

μ = Effect of treatment block

αi = Effect of supplementation with tuna fish oil soap and oil lemuru protected -i

ij = effect of experimentalε error in the -j inclusion of supplementation soap tuna fish oil and

fish oil protected lemuru -i

d. Scope and Step Activities:

Step one:

Fermentation of rubbish market with yeast tape Namely rubbish market materials and then steamed and ditiris diusar with yeast tape 5 grams / kg of rubbish market, the next 3 days of fermentation and dry concentrate mixed with other materials to replace grass

Step two:

Finding a protected fat products that contain highly unsaturated fatty acids and the most resistant to the process of dehydrogenation of rumen. Protected fat product made through a combination process of Saponification and inkapsulasi lemuru fish oil, tuna oil using NaOH 10%, 10% starch and saturated $CaCl_2$ solution. Saponification and inkapsuilasi done by lemuru fish oil, tuna fish is heated at a temperature of 60-80^0 C for 10 minutes and then mixed with 10% NaOH solution while stirring and add 10% starch solution to form a paste of clay. Clumps of

settling for one night to harden. Clumps of crystallized soap obtained by soaking with a solution of saturated $CaCl_2$ for 2 hours. Fatty acid soap crystals formed was filtered and then pressed and then dried in an oven or drying. Fatty acid soap crystals that have been dried in digestibility trials and resistance to the process of dehydrogenation of rumen and its influence on rumen cellulolytic activity insaco method. Digestibility of fat based differences in total fat content in the crystal soap before and after the incubation in the rumen of dairy cows for 2 to 12 hours. Resilience crystal soap on rumen dehydrogenation process is based differences in levels of unsaturated fatty acids oleic, linoleic and linolenic acid in the crystal soap before and after incubation in the rumen for 2 to 12 hours. Effect of crystal soap based on cellulolytic microbial activity total units cellulase enzyme and reducing sugar formed during the incubation in the rumen 2 to 12 hours compared to controls. Cellulolytic microbial activity is also based pH conditions and NH3 production in the rumen and digestibility of crude fiber (ADF and NDF).

Step Three:

Is the use of levels of fermented cassava to replace yellow corn material and transfer of fatty acid soap crystals selected from step II research results into the most appropriate feed sheep that can improve production performance and meat quality of sheep.Implementation of stage III (The In Vivo): In Vivo Research is divided into three stages, including preliminary and collection stage adaptation. Stage adaptation aims to familiarize the animals adjust to the sheep pen, the environment and feed to be used. The things done in stage adaptations include: providing feed to be used little by little but as often as possible, to provide drinking water ad libitum. Stop the stage adaptation of sheep to consume food after the experiment as well (approximately one week). Preliminary stage aims to eliminate the influence of feed on the previous period. The things done in the preliminary period, among others: do randomization feed treated in each group, calculating the weight gain (feed given daily at approximately 7:00 pm) to determine the needs of feed must be provided, making this period more or less four weeks. Collection phase is the data acquisition phase of the treatment being tested. The method used is the total collection by Schneider and Flatt (1975) conducted for 7 days with the following steps: a) collecting and weighing of feed treatment (administration and the rest) to determine the daily intake of each sheep, b) to collect faeces from each sheep every day, c) take samples of faeces and feed treatment (administration and residual) as much as 5 percent of the weight of the collected every day, d) spraying feces samples using 5% formalin, e) dried samples of feed and feces into the oven at a temperature of 60^0C. The last stage of cattle are slaughtered beef catlle and taken 25% of the total beef catlle to do as the sample used for analysis of cholesterol, fat content and fatty acids levels, and peroxide value and TBA number (Acid thiobarbiturat) ..

RESULTS AND DISCUSSION

a. Crude Protein Content of the market waste material Determination of crude protein content in cassava done as much as 4 times that in the fermentation day 0, day-to-1, 5 day 3 and day to 4.5, each repeated 3 times. From the analysis of data showed that the highest average crude protein content obtained on treatment day 3 of fermentation that is equal to 6.80 percent, while the lowest average obtained in the treatment of fermentation to 0 that is equal to 5,20 percent.

Results of analysis of variance showed that the length of fermentation treatment significant ($P < 0.01$) on crude protein content. To know the magnitude of the differences in the effect of each treatment, followed by orthogonal contrast test Treatment of long fermentation day 3 were significantly different ($P < 0.01$) than the old treatment of fermentation day-0, to 1.5 and to 4.5. During the fermentation process increased the average crude protein content of 5.2 percent of

day-to-0 to 6.80 percent on day 3. At the beginning of fermentation fungus threads started its activities with the germination of spores (log phase). In the initial state of the first changes is the protein component. Proteins in cell activation so that the enzyme had become active. After organ function then food from the substrate, which is usually a simple sugar (glucose) is used to power growth. Furthermore, fungal threads begin to synthesize the enzyme to break down more complex components such as starch, fats and proteins. Previous authors have stated that the crude protein content of the proportion to be larger because the rate of protein perormbakan runs slower than the rate of reform of the macro levels of other nutrients. Judoamijoyo et al (1992) states that increasing crude protein levels due to an increase in protein content during fermentation, this happens because there is the addition of protein produced by the mold (fungus threads). The increase in protein content occurs because there is enzyme activity produced by a fungus that is able to remodel substances food especially protein. Winarno and Fardiaz (1973) stated that food ingredients that have occurred because of the enzymes produced by microorganisms. Yuniah (1996) states that increasing crude protein content because there are enzymes break down starch so that the activity of the chemical composition of a material change (carbohydrates and fats) to be low. Crude protein content on day 4.5 decreased to 3.66. percent. This happens because since the beginning of fermentation the amount of cells (population) fungal threads continue to increase while the number of food ingredients derived from the substrate continues to decrease. On day 3 of the population-fungal threads at the maximum point (stationary phase), in which the entire cell can be provided for the needs of the food. In these phases the amount of enzyme reached its maximum in order to obtain the maximum fermentation. After fermentation up to day-to-4, 5 fungal populations decreased yarn, this is due to a struggle for diminishing food so that fungi are not capable of competing experience death. This situation resulted in the amount of enzyme is reduced. b. Fatty Acid Composition of catlle Meat Composition and fatty acid content of catlle meat are listed in Table 1. Supplementation with fish oil soap and tuna fish oil protected lemuru will increase the content of omega-3 (Table 1) in sheep meat, especially ALA, EPA and DHA were significantly different with control diet (P0) and the diet using 20% cassava fermented (P1) diets supplemented with L-carnitine (P2), Rations (P2) supplemented with protected tuna fish oil soap as much as 4% in ration (P3) and ration (P2) supplemented with fish oil soap lemuru protected by 4 % (P4) .. This is in line with research Marshall et al (1994) is cited by Leskanich and Noble (1997) and Sudibya et al (2009) that the ration of dairy cows supplemented with tuna fish oil soap and lemuru protected up to the level of 4% in the diet can increase the acid content omega-3 than the control diet.

Table 1. Meat catlle fatty acid composition

Fatty acids lipids (%)	P_0	P_1	P_2	P_3	P_4
C14:0	3,11	3,12	3,01	3,46	3,23
C16:0	28,51	28,54	28,28	18,64	18,19
C16:1	15,51	15,65	15,98	11,72	11,32
C18:0	5,28	5,14	5,36	7,24	7,56
C18:1	14,56	14,08	13,90	12,80	12,90
C18:2n-6 (linoleic)	20,46	20,18	21,20	22,40	22,60
C18:3n-3 (Linolenic)	0,41	0,51	0,25	0,40	0,53
C20:0	0,70	0,60	0,75	0,86	0,80
C20:1	4,20	4,10	4,30	9,20	8,90
C20:4n-6 (Arachidoneic)	2,02	3,63	2,32	7,40	8,04
C20:5n-3 (EPA/Eicosapentaenoic)	2,49	2,51	2,50	3,20	3,22
C22:6n-3 (DHA/Docosahecsaenoic):	1,95	1,95	2,05	2,68	2,71

Total unsaturated fatty acids	**62,40**	**62,60**	**62,50**	**69,80**	**70,22**
Total saturated fatty acids	**37,60**	**37,40**	**37,50**	**30,20**	**29,78**
Total omega-3 fatty acids	**4,85**	**4,96**	**4,80**	**6,28**	**6,46**
Total omega-6 fatty acids	**23,28**	**23,81**	**23,52**	**29,80**	**30,64**
Ratio omega-3:Omega-6	**1:4,8**	**1:4,8**	**1:4,8**	**1:4,7**	**1:4,7**

c. Cholesterol Levels catlle Meat.

Catlle meat cholesterol levels of the lowest in P4 treatment that is 113,80%, while the highest at P0 ie 141.10% .. Data can be seen in Table 2. Statistical analysis showed that supplementation with tuna fish oil and fish oil protected lemuru significant (P <0.01) cholesterol of meat catlle. Of further test orthogonal contrasts showed that cholesterol lamb on P0, P1 and P2 significant than P3 and P4. Furthermore, P1 and P2 differ very significantly with the P3 and P3 insignificantly different from P4. Table 2. The average levels of cholesterol, LDL and HDL levels and fat content of meat catlle.

Table 2. Average concentration cholesterol, lipids, LDL and HDL of meat cattle

Parameter measurement	**P_0**	**P_1**	**P_2**	**P_3**	**P_4**
Concentration cholesterol (%)	**$141,10^a$**	**$140,90^a$**	**$131,0^a$**	**$114,20^b$**	**$113,80^b$**
Concentration lipids (%)	**$4,55^a$**	**$4,65^a$**	**$4,60^a$**	**$4,20^b$**	**$4,10^b$**
Concentration LDL (mg/dl)	**$42,05^a$**	**$41,90^a$**	**$41,80^a$**	**$35,80^b$**	**$35,80^b$**
Concentration HDL (mg/dl)	**$57,95^a$**	**$58,10^a$**	**$58,20^a$**	**$64,30^b$**	**$64,20^b$**

Legend: Row with different supercript are more significantly (P<0,01)

Cholesterol content of catlle meat plus L-carnitine (P2) did not decrease when compared to (P1) in line with the opinion (Sudibya et al., 2010) which states that l-carnitine supplementation can be used to lower cholesterol levels lamb, this in line with the opinion of Owen et all (1996) that l-carnitine supplementation to function, among others, can lower cholesterol content in the product.

Besides the addition of soap being protected from tuna fish oil and fish oil can lower cholesterol content lemuru lamb seen in P3 and P4, it concurred with Sutardi (1998) in Sudibya et al., (2006.2007 and 2010) that cholesterol levels in meat beef cattle and goat meat and milk of dairy cows to go down due to the transfer of omega-3 fatty acids, this can be explained that the omega-3 fatty acids work by stimulating the catabolism of HDL cholesterol to the liver back into bile acids and not regenerated again but released with excreta , so that the cholesterol content in excreta increased due to further deposition of cholesterol levels in sheep meat is reduced .. Furthermore insignificantly different P3 P4, this is caused by the soap content of unsaturated fatty acids protected between lemuru fish oil with tuna fish oil is relatively the same so that different effects may seem unreal.

d. Catlle Meat Fat content .

Here are the fat content of catlle meat as shown in Table 2. Fat content of the lowest in P4 treatment ie 4.10%, while the highest at P0 that is 4.55 percent. Statistical analysis showed that fish oil supplementation soap and tuna fish oil protected lemuru significant (P <0.05) on the lipid

content of catlle meat. Of further test orthogonal contrasts showed that the lipid content of sheep meat in the P0 and P1 significant than P2, P3 and P4. Further significant than P2 and P3 P0 P4.but insignificantly different from P1 and P3 P4 insignificantly different. Mutton fat content of the added L-carnitine (P2) has decreased when compared to the P0 and P1 in line with the opinion (Owen et al., 1996)) which states that L-carnitine supplementation can be used to reduce levels of fat in a product In this study supplementation of fish oil soap lemuru and protected tuna fish oil can lower the fat content of catlle meat, as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil is relatively the same so that its influence does not seem different.

e. LDL (Low Density Lipoprotein) catlle meat

LDL (Low Density Lipoprotein) catlle showing the highest rate in the P0 treatment ie 42.05 mg / dl, while the lowest rates in treatment P4 ie 64,20 mg / dl. . Statistical analysis showed that supplementation with tuna fish oil soap and fish oil protected lemuru significant ($P < 0.01$) on levels of LDL catlle. Of further test orthogonal contrasts showed that levels of LDL catlle on P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4. and insignificantly different P3 P4. However P0 insignificantly different from P1 and P2 and P1 also insignificantly different from P2. catlle LDL plus L-carnitine (P2) has decreased when compared to the P0 and P1 in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can be used to lower LDL levels because of L-carnitine able to lower LDL cholesterol content but are part of the cholesterol. In addition, fish oil supplementation lemuru soap and protected tuna oil can lower LDL cholesterol content of catlle meat, as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil protected soap lemuru with tuna fish oil is relatively the same so that its influence does not seem different.
In addition, fish oil supplementation protected soap can reduce LDL content of catlle meat, it is agreed by Komari (1994) and Layne et al., Sinclair (1996) and Sudibya et al., (2009) which states that the addition of unsaturated fatty acid extract capable reduce levels of LDL in animals.

f. Levels of HDL (High Density Lipoprotein) of catlle meat

Levels of HDL (High Density Lipoprotein) meat catlle showing the lowest number in treatment P0 ie 57.95 mg / dl, while the highest rate in the P4 treatment that is 61.83 mg / dl. Statistical analysis showed that fish oil supplementation protected soap significant ($P < 0.01$) on HDL levels catlle. Of further test orthogonal contrasts showed that HDL catlle on P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4. . But insignificantly different P3 and P4. HDL catlle plus L-carnitine (P2) increased when compared to the P0 and P1 in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can be used to raise levels of HDL because HDL is a part of cholesterol. In addition, fish oil supplementation lemuru soap and protected tuna oil to increase the HDL content of catlle meat, as evidenced in the P3 and P4, this is because the soap is being protected from fish oils contain unsaturated fatty acids. Furthermore insignificantly different P3 and P4, this is caused by the content of unsaturated fatty acids in fish oil soap between lemuru protected with tuna fish oil is relatively the same so that its influence does not seem different. In addition, fish oil supplementation protected soap can raise HDL cholesterol content of catlle meat, it is agreed by Komari (1994) and Layne et al., and Sinclair (1996) and Sudibya et al (2009) which states that the addition of unsaturated fatty acid extract is able to raise HDL levels in animal models of products

g. Levels of Omega-3 fatty acids (linolenic) in catlle meat

Levels of omega-3 fatty acids are highest in the P4 treatment .6.46 % while the lowest was 4.85 percent. Furthermore P0 which can be seen in Table 3. Statistical analysis showed that supplementation with tuna fish oil soap and fish oil protected lemuru significant (P <0.01) on levels of omega-3 fatty acids of catlle. Of further test orthogonal contrasts showed that levels of omega fatty acids of catlle on P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4. But insignificantly different P3 P4 Levels of omega-3 fatty acids plus L-carnitine (P2) does not increase when compared to the P0 and P1 in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can not be used to increase levels of acid omega-3 because L-carnitine itself does not contain omega-3 fatty acid.The addition of fish oil soap lemuru and protected tuna oil to increase the content of omega-3 fatty acids of catlle, as evidenced in the P3 and P4, this is because both these protected fish oil soaps contain unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil is relatively the same so that its influence does not seem different.

Table 3. Average concentration content omega-3 and omega-6, unsaturated,

saturated, EPA and DHA fatty acids of meat catlle

Parameter measurement	P_0	P_1	P_2	P_3	P_4
Content omega-3 fatty acid (%)	4,85[a]	4,96[a]	4,80[a]	6,28[b]	6,46[b]
Content omega-6 fatty acid (%)	23,28[a]	23,81[a]	23,52[a]	29,80[b]	30,64[b]
Content unsaturated fatty acid (%)	62,40[a]	62,60[a]	62,50[a]	69,80[b]	70,22[b]
Content saturated fatty acid (%)	37,60[a]	37,40[a]	37,50[a]	30,20[b]	29,78[b]
Content EPA (*Eikosapentaenoic acid*)	2,490[a]	2,505[a]	2,495[a]	3,200[b]	3,215[b]
ContentDHA (*Dokosaheksaenoic acid*	1,950[a]	1,950[a]	2,050[a]	2,680[b]	2,710[b]

Legend: Row with different supercript are more significantly (P<0,01)

In addition, fish oil supplementation protected soap to raise the content of omega-3 fatty acids, this can be explained other than oil as an energy source can also be a source of unsaturated fatty acids so as to raise the level of omega-3 fatty acids in catlle meat. This is in line with the opinion of Suarez et al. (1996) which states that the omega-3 supplementation in the diet influence the concentration of omega-3 fatty acids in body tissue. Furthermore, when compared to research Sudibya et al. (2006 and 2007) which states that the content of omega-3 fatty acids in beef cattle supplemented with fish oil lemuru of 5.92% and 5.96% for goat meat, in this study over a slightly higher value but still with in normal limits. Until now, that are considered by the experts are usually the ratio between omega-3 fatty acids and omega-6. In this study turned out to have a ratio of 6.46.% (1) with 30.64% (5,0). This is supported by Newton (1996) that the recommendations of WHO and FAO have a ratio of omega-3 and omega-6 of 1:5.

h. Levels of Omega-6 fatty acids (linoleic) in catlle meat

Levels of omega-6 fatty acids the highest at P4 treatment that is 30.64% while the lowest at P0 that is 23.28 percent. Further can be seen in Table 3. Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) on levels of omega-6 fatty acids of catlle. Of further test orthogonal contrasts showed that levels of omega-6 fatty acids of catlle on P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4, however insignificantly different P3 P4. Levels of omega-6 fatty acids plus L-carnitine (P2) does not increase when compared to the P0 and P1 in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can not be used to increase levels of acid omega-6 since L-carnitine itself does not contain omega-6 fatty acids.Supplementation with fish oil soap lemuru and protected tuna fish oil can improve the content of omega-6 fatty acids of catlle, as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids are high. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil is relatively the same so that its influence does not seem different. In addition, fish oil supplementation protected soap to raise the content of omega-6 fatty acids, this can be explained other than oil as an energy source can also be a source of unsaturated fatty acids so as to raise the level of omega-6 fatty acids in catlle meat. This is in line with the opinion of Suarez et al. (1996) which states that the omega-3 supplementation on ration affect the concentration of omega-6 fatty acids in body tissue. Furthermore, when compared to research Sudibya et al. (2006 and 2007) which states that the content of omega-6 fatty acids in beef cattle supplemented with fish oil lemuru of 36.92% and the goat meat for 35.23 percent, in this study the value of 36.267%, this value is not much different, but still within normal limits. Until now, that are considered by the experts are usually the ratio between omega-3 fatty acids and omega-6. In this study turned out to have a ratio of 6.46 per cent (1) with 30.64% (5,0). This is supported by Newton (1996) that the recommendations of WHO and FAO have a ratio of omega-3 and omega-6 of 1:5.

i. Unsaturated fatty acid levels in catlle meat

Unsaturated fatty acid content of the highest in P4 treatment that is 70.22% while the lowest at P0 that is 62.4%. Data can be seen in Table 3. Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) of unsaturated fatty acid content of catlle meat. Of further test orthogonal contrasts showed that levels of unsaturated fatty acids of catlle on P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4. But insignificantly different P3 P4 on catlle.. Levels of unsaturated fatty acids plus L-carnitine (P2) does not increase when compared to the P0 and P1, this is in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can not be used to increase levels of acid unsaturated fats because L-carnitine itself does not contain unsaturated fatty acids .. In addition, tuna fish oil supplementation of soap and oil to raise lemuru protected unsaturated fatty acid content, this can be explained other than oil as an energy source can also be a source of unsaturated fatty acids so as to raise the level of unsaturated fatty acids in meat catlle. This is in line with the opinion of Suarez et al. (1996) which states that the unsaturated fatty acid supplementation in diet affect the concentration of unsaturated fatty acids in body tissue. Furthermore, when compared to research Sudibya et al. (2003., 2006, 2009 and 2010) which

states that the content of unsaturated fatty acid on beef cattle, goat and dairy cow's milk supplemented with fish oil and fish oil tuna lemuru very significant effect. In this study, unsaturated fatty acid content reached 70.22 percent, it is extremely beneficial as a catlle as a source of fatty acids in human esensiel.

j. Saturated fatty acid levels in catlle meat

Levels of saturated fatty acids the highest at P0 that is 37.60%, while the lowest was in treatment that is 29.78% P4. Data can be seen in Table 3. Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) saturated fatty acid content of catlle meat. Of further test orthogonal contrasts showed that saturated fatty acid content of catlle meat in P0, P1 and P2 significant than P3 and P4. Further significant than P2 P3 and P4. But insignificantly different P3 P4 on catlle .. Levels of saturated fatty acids plus L-carnitine (P2) did not decrease when compared to the P0 and P1, this is in line with the opinion (Owen et al., 1996) which states that L-carnitine supplementation can not be used to reduce levels of fatty acids saturated as the L-carnitine it self does not contain unsaturated fatty acids .. In addition, tuna fish oil supplementation of soap and fish oil can lower lemuru protected unsaturated fatty acid content, this can be explained other than oil as an energy source can also be a source of unsaturated fatty acids so as to reduce levels of saturated fatty acids in meat catlle. This is in line with the opinion of Suarez et al. (1996) which states that the unsaturated fatty acid supplementation in diet affect the concentration of saturated fatty acids in body tissue. Furthermore, when compared to research Sudibya et al. (2003., 2006 and 2009) which states that the saturated fatty acid content in beef cattle, goats and milk of dairy cows supplemented with fish oil and fish oil tuna lemuru very significant effect. In this study, saturated fatty acid content reached 29.78 percent, it is extremely beneficial as a catlle as a source of fatty acids in human esensiel.

k. Levels of EPA (eicosapentaenoic) in catlle meat

EPA levels are highest at P4 treatment ie 3.125% while the lowest at P0 which is 2.49%. Data can be seen in Table 3. Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) against the EPA content of catlle meat. Of further test orthogonal contrasts showed that levels of EPA catlle on P0, P1 and P2 significantly very real with the P3 and P4. Further significant than P2 P3 and P4. But insignificantly different P3 P4.EPA levels of added L-carnitine (P2) was not significantly different when compared with the P0 and P1, this is in line with the opinion of Owen et al (1996) which states that the addition of L-carnitine will not be able to increase the EPA content in the meat because of L-carnitine does not contain unsaturated fatty acids. In addition, tuna fish oil supplementation of soap and fish oil can improve the content of protected lemuru EPA , as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil EPA primarily the same relative levels of influence does not seem so different. This is in line with the opinion of Suarez et al. (1996) which states that the unsaturated fatty acid supplementation in diet affect the concentration of EPA in the body tissue. Furthermore, when compared to research Sudibya et al. (2006, 2007 and 2099) which states that the EPA content in beef cattle supplemented with fish oil lemuru by 3.02 percent and the goat meat by 3.12 percent, and the dairy cow's milk at

0.89 percent, at this study the price is not too far away but still within normal limits. In this study, the EPA content reached 3.75 percent, it is very profitable for catlle meat as a source of EPA in humans.

L. Levels of DHA (docosahexaenoic) in catlle meat

DHA levels are highest at P4 treatment ie 2.71%, while the lowest was 1.95% ie P0 treatment. Data can be seen in Table 3. Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) on DHA levels in carlle meat. Of further test orthogonal contrasts showed that levels of DHA on P0, P1 and P2 differ very significantly with the P3 and P4. Further significant than P2 P3 and P4 Levels of DHA plus L-carnitine (P2) was not significantly different when compared with the P0 and P1, this is in line with the opinion of Owen et al (1996) which states that the addition of L-carnitine will not be able to increase DHA content in the product because of L-carnitine does not contain unsaturated fatty acids. In addition, tuna fish oil supplementation of soap and oil lemuru protected right to increase DHA content of catlle meat, as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil mainly DHA levels are relatively the same so that its influence does not seem different. This is in line with the opinion of Suarez et al. (1996) which states that the unsaturated fatty acid supplementation in diet affect the concentration of DHA in body tissue. Furthermore, when compared to research Sudibya et al. (2006.2007 and 2009) which states that the content of DHA in beef cattle supplemented with fish oil by 2.40 percent and the goat meat at 2.405 percent and the milk of dairy cattle at 3.17 percent, so in this study is lower but still within normal limits. In this study, DHA content reached 2.71 percent, it is very profitable for catlle meat as a source of DHA in humans.

I. Conten number peroksida of catlle meat

Content number peroksida of catlle meat that highly of treatment P_3 that 0,2504 miliequivalen per kg, where as the lower of treatment P_0 that 0,1309 miliequivalen per kg.. All data can to see table 4.

Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) on peroksida levels in carlle meat. Of further test orthogonal contrasts showed that levels of peroksida P0, P1 and P2 differ very significantly with the P3 and P4. Further significant than P2 P3 and P4 Levels of peroksida plus L-carnitine (P2) was not significantly different when compared with the P0 and P1, this is in line with the opinion of Owen et al (1996) which states that the addition of L-carnitine will not be able to increase peroksida content in the product because of L-carnitine does not contain unsaturated fatty acids. In addition, tuna fish oil supplementation of soap and oil lemuru protected right to

increase peroksida content of catlle meat, as evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil mainly peroksdida levels are relatively the same so that its influence does not seem different.

Table 4. Average conten number peroksida and number TBA of catlle meat

Parameter measurement	P_0	P_1	P_2	P_3	P_4
Contennumberperoksida (miliequivalen/kg	$0,1309^a$	$0,1311^a$	$0,1312^a$	$0,2425^b$	$0,2504^b$
Conten number malonaldehide (mg/kg)	$1,3037^a$	$1,3097^a$	$1,3370^a$	$1,6253^b$	$1,6257^b$

Legend: Row with different supercript are more significantly (P<0,01)

Suplementation fish oil lemuru can increasing content number peroksida, because fish oil energy source and source content number peroksida. There fore can increasing content number peroksida of meats. In this research content number peroksida of catlle meat it is 0,2504 miliequivalen per kg with by report Septiana et al (1997) that is highly but of normal.

l. Conten number TBA (Malonaldehide) of catlle meat

Content number malonaldehide of catlle meat that highly of treatment P_4 that 1.6257 mg/kg, where as the lower of treatment P_0 that 1,3037 mg/kg.. All data can to see table 4.

Statistical analysis showed that fish oil supplementation protected soap significant (P <0.01) on malonaldehide levels in carlle meat. Of further test orthogonal contrasts showed that levels of P0, P1 and P2 differ very significantly with the P3 and P4. Further significant than P2 P3 and P4 Levels of malonaldehide plus L-carnitine (P2) was not significantly different when compared with the P0 and P1, this is in line with the opinion of Owen et al (1996) which states that the addition of L-carnitine will not be able to increase malonaldehide content in the product because of L-carnitine does not contain unsaturated fatty acids. In addition, tuna fish oil supplementation of soap and oil lemuru protected right to increase malonaldehide content of catlle meat, as

evidenced in the P3 and P4, this is because both the fish oil contains unsaturated fatty acids. Furthermore insignificantly different P3 P4, this is caused by the content of unsaturated fatty acids in fish oil lemuru with tuna fish oil mainly malonaldehide levels are relatively the same so that its influence does not seem different.

Suplementation fish oil lemuru can increasing content number malonaldehide, because fish oil energy source and source content number malonaldehide. There fore can increasing content number malonaldehide of meats. In this research content number malonaldehide of catlle meat it is 1,6257 mg/kg with by report Septiana et al (1997) that is highly but of normal.

CONCLUSIONS AND IMPLICATIONS

A. Conclusion

1. Yeast fermentation technology with tape on the market rubbish time day-to-3 can increase the crude protein content of 5.20 percent to 6.80 percent.
2.Suplementasi soap tuna fish oil and fish oil lemuru protected up to level 4 percent of the diet that made from raw and fermented market rubish contain L-250 ppm carnitine can lower cholesterol levels from 141.10% to 113.80% and LDL of meat from 42.05 mg/dl to 35.80 mg/dl and lipid of meat from 4.55% to 4.20 percent.Furthermore to increase HDL (high density lipoprotein) from 57.95 mg/dl to 64.20 mg/dl. Suplementation protection tuna or lemuru fish oil in the ration 250 ppm l-carnitin to increased the omega-3 fatty acids of meat from 4.85% to 6.46%, omega-6 fatty acid from 23.28% to 30.64%, fatty acids polyunsaturated of meat from 62.40% to 70.22% and EPA from 2.49% to 3.22% then DHA from 1.95% to 2.71%. There for reduction of fatty acids saturated of meat from 37.60% to 29.78 percent and increase number peroksida from 0,1309 to 0,2504 miliequivalen/kg and number TBA from 1,3037 to 1,6257 mg/kg on the meat catlle.

B. Implication

Supplementation with tuna oil soap and oil lemuru protected up to the level of 4 percent can be done in catlle rations made from raw fermented market rubish contain L-carnitine and 250ppm

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