Utilization of Sunflower Seeds Oil and Sardine to Get Goat’s Milk Has Balanced Omega 3 and Omega 6 Ratio

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Abstract

Sunflower seeds are the result of a suitable plantation in tropical, especially in Indonesia. Production of the sardine (Sardinella longiceps) on average achieve only 15.84 per year from the total production of all kinds of fish in Indonesia (Bandie, 1982). Sardine oil and sunflower seed are exploited as a source of oil. Both of these ingredients have a material side of main product processing. Both of these materials can be utilized more, because they have been proven to be sunflower seeds contain a high omega 3 and lemuru oil with a high omega 6. The quality of the feed can determine the quality of the production. PE (Peranakan Ettawah) is a local goat, from kacang goat and etawa goat. It has the advantage of a good milk production. If the goat is given the sunflower seeds meal (BBM) and sardine meal that is processed into a mixture of carboxylic salt dry expected (CGKK) to contain omega 3 and omega 6 are balanced. The research used 5 treatments in three times. There were 15 females of PE goats from Cordero Farm, Ciapus, Bogor. Each goat was given the sunflower seeds meal and carboxylic salt dry expected with different percentage. Research was done by giving feed adaptation for two weeks and feed treatment for 1 week. Fatty Acid of milk production was analyzed by Gas Chromatography. The results showed that CGKK 1.8% and BBM 5% could produce omega 3 and omega 6 balanced, with an optimal ratio for body health 1: 4. Sunflower Seed and sardine could be used as fodder for PE goats to produce goat milk with balanced omega 3 and omega 6 ratio.

Key words: omega 3 and omega 6, peranakan ettawah goat, sunflower seed meal, sardine oil
Introduction

The pattern of human lives demands a flurry of fast food and the selection of an option in this day and age. Fast food has a lot of weaknesses especially from various diseases caused by consumption. Healthy and complete food containing the complete and healthy nutrition, one of the healthy food and complete is goat’s milk. Goat’s milk is one of the products of livestock has outcome nutrient complete and healthy. The quality of goat’s milk is influenced from the quality of the feed goats provided. Goat’s milk is a source of essential fatty acids. At least 50 kinds of fatty acids in milk fat comprising 60-75% are saturated, 25-30% is not saturated and about 4-5% is polyunsaturated fatty acid, while omega-3 fatty acids are more or less 0.5% (Buckle et al., 2007). Because of fatty acid content unsaturated on milk goat just a little, it can be increased her womb through distributing feed with quality fatty acid content unsaturated a high especially the womb omega-3 and omega-6 on milk goat. Omega-3 can play role in the prevention atherosclerosis, tumour growth, thrombosis, hypertriglyceridemia and high blood pressure. Omega-6 can increase effectiveness insulin from the pancreas, effected lower blood sugar levels, and important in the process of growth and development of body.

The feed is added to increase the content of omega-3 and omega-6 on goat’s milk for using industrial waste. The feed material that may be used is derived from the sunflower seeds meal processing by-product of sunflower seeds oil. Sunflowers are cultivated in the area in East Java, Malang or Sengkaling in the area of Blitar. Production of sunflower seeds in Blitar area is quite high, i.e. 3 tonnes of seeds/acre. In addition to sunflower seeds meal (SSM), added all the ingredients of fish oil. Fish oil can be processed into carboxylic salt dry mixture (CSDM). CSDM is added to the ration of beef cattle to the concentration of essential fatty acids such as EPA (20:5) and DHA (22:6). CSDM is the result of drying the mixture with onggok that uses carboxylic sardine oil by hydrolysis (Tasse, 2010).

CSDM and sunflower seeds meal on a dairy goat to supply essential fatty acids are expected to be a precursor for the synthesis of fatty acids in milk that are beneficial to the health of the omega-3 and omega-6. Omega-3 and omega-6 should be balanced with the optimal ratio of omega-3 to omega-6 in human body is 1: 4 to 1: 110 (Brown, 1990). It is expected of the CSDM and sunflower seeds meal on the PE goat’s ration of feed will yield milk containing omega-3 and omega-6.

Materials and Methods

This research has been conducted for four months from January to May 2012. The location of PE goat maintenance is in Dairy Goat Cordero Farm, Ciaus, Bogor. Test of milk quality has been done in Dairy Laboratory, Animal Production and Technology Department, Faculty of Animal Science, Bogor Agricultural University.
Analysis of the fatty acid content of the feed is done in the Center for Agricultural Research and Development, Post Harvest, Cimanggu, Bogor and Yogyakarta. Materials used in this research were the goat milk, CSDM, PE goat, sunflower seeds meal (SSM), fish oil, HCl, KOH, aquadest, H$_2$SO$_4$, NaCl, amilo alkohol, and phenolptaln. Equipment for create CSDM, milkotester, gas chromatography, oven, scales, plastic packaging, and labelling.

Experimental Animals used 15$^{th}$ dairy goat Straits Ettawah. There are 15$^{th}$ PE goats adapted for 14 days. CSDM: principles of creation of manufacture CSDM i.e. hydrolysis of fish oil with the acid solution. Fish oil mixed with a solution of HCl and then beaten. Next, add aquadest and heated (60°C for 30 minutes). Free fatty acid or carboxylic acid resulting from acid hydrolysis of fish oil was added to a solution of KOH first and stirred, then stored in room temperature. Salts were formed and then mixed with tapioca flour or ongkok by comparison with fish oil ongkok 1: 5 b/b. It was dried in the oven (32°C). Experiments design was random design complete with 5 treatments, each 3 replication. Research was conducted within 1 week with the period of adaptation in 2 weeks. As for treatment at goat lactation as follows: A= Basal Ration (dreg of tempe, molasses, and grass fields), B= Basal Ration CSDM 1.2%, C= Basal Ration SSM 3%, D= Basal Ration CSDM 1.2% and SSM 3%, E= Basal Ration and CSDM 1.8% and SSM 5%. Deposits of the fatty acids Omega-3 and Omega-6: done with lipid extraction from a sample then methylation of fatty acids in fat and fatty acid analysis with gas chromatography.

Results and Discussion

Added daily body weight gain (BWG) and goat milk production per day obtained during treatment (Table 1). The treatments had no effect on body weight and increasing of daily milk production per day. CSDM and sunflower seed meal had a fairly high fat content which acts as an energy source for dairy goat, CSDM with a little addition, was about 1.2-1.8%, and sunflower seeds meal 3-5% in mixed fodder did not give the changes in the productivity of milk per day and body weight gain.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Treatments</th>
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<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Body weight gain (kg)</td>
<td>0.47±0.27</td>
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<tr>
<td>Milk production per day (ml)</td>
<td>1138.89±367.17</td>
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</tbody>
</table>

Note: A= Basal Ration (dreg of tempe, molasses, and grass fields), B= Basal Ration CSDM 1.2%, C= Basal Ration SSM 3%, D= Basal Ration CSDM 1.2% and SSM 3%, E= Basal Ration and CSDM 1.8% and SSM 5%.
Although there was no significantly different on treatments, but milk production and body weight gain in daily treatment A (control) was constant, while grouse treatment goats were lower productivity because the goat should adapt to the new feed as well as some goats had dry periods and entered the pregnancy periods. During this period, the goat required to prepare for the birth the nutrients consumed were absorbed for foetus growth so that only a small proportion of nutrients for livestock used for productivity both in the form of added weight loss or produce milk. The difference time of lactation in group treatments also caused a difference in productivity of milk produced. Deposits of the fatty acids omega-3 and omega-6 in goat milk are presented in Table 2. Deposits of the fatty acids omega-3 and omega-6 in the goat’s milk with the addition of treatment CSDM and sunflower seeds meal in the feed shows the variation in statistics were not significantly different.

Table 2. Essential fatty acid omega-3 and omega-6 in milk of PE goat with different treatments

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<th>Parameters</th>
<th>Treatment</th>
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<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Omega 3</td>
<td>1.65±1.03</td>
</tr>
<tr>
<td>Omega 6</td>
<td>6.20±1.35</td>
</tr>
</tbody>
</table>

Note: A= Basal Ration (dreg of tempe, molasses, and grass fields), B= Basal Ration CSDM 1.2%, C= Basal Ration SSM 3%, D= Basal Ration CSDM 1.2% and SSM 3%, E= Basal Ration and CSDM 1.8% and SSM 5%.

Although there was no significantly difference in statistic, but there was tendency of increasing Omega 3 and Omega-6 in treatments B, C and D compared with control (Treatment A) and D. Treatment B was given extra feed CSDM by as much as 1.2% average content of fatty acids produces the highest among the other levels of 16.81% of omega 3 and omega 6 18.23%. The influence of the administration of CSDM affected on fatty acids in plasma on ration became incorporated in the goat’s milk fat (Tasse, 2010). Treatment C, of feed given as much sun seed SSM 3% produced milk with quite high of omega-6, so sunflower seed meal can be used as source of omega 6 on Dairy Goat feed. This is supported by Astawan (2009) that sunflower seeds are a source of omega-6 fatty acids. On treatment of the D and E, a combination of CSDM and sunflower seed meal produced the expected content of omega-3 and omega-6 balanced. The balance of these two kinds of fatty acids are very important, because each of the fatty acids have opposite functions, such as the omega-3 that served as a bitter taste and omega-6 as the cause of inflammation is when one of the fatty acid content of unbalanced will cause losses. The composition of the omega that is optimal for body with a comparison of omega-3 and omega-6 i.e. 1: 4 (Brown, 1990), then the most approaching for such purposes was the treat-
ment of D with the addition of SSM 3% and CSDM 1.2%. The fat content in milk is influenced by several factors of nutrients among other things: (1) the concentration, consumption, and the source of carbohydrates instead of fiber; (2) the feed particle size; (3) the use of probiotics; (4) the number of, the physical form, and composition of fatty acids in feed; (5) the availability of precursors of trans-10, cis-12 conjugated linoleic acid that can decrease the levels of fat (Pulina et al., 2008).

Conclusions

Fish oil and sunflower seed meal can be used as animal feed. The results of this research with fish oil and sunflower utilization could increase the content of unsaturated fatty acids in goat milk and get a balance of omega-3 and omega-6.

Acknowledgement

This research was funded by Directorate General of Higher Education (DIKTI) Republic of Indonesia.

References