THE EFFECT OF GIVING WAKE-WANGUN LEAF BISCUITS (*Coleus amboinicus Lour*) AS SUPPLEMENTARY FEED ON THE QUALITY OF SAPERA GOAT MILK

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**Abstract**

Bangun- Bangun leaf biscuits is a feed product that can be used as additional feed for Sapera goats in an effort to increase milk quality. The purpose of this study was to determine the quality of milk of Sapera goats that were given Bangun-bangun leaf biscuits (*Coleus amboinicus Lour*). This research was conducted at the Kanaya farm, Deli Serdang District, North Sumatra Province. This research lasted for 2 months from August until October 2022. The design used was a completely randomized design (CRD) with three treatments and three replications. The treatment consisted of P0 = 50% forage + 50% concentrate, P1 = 50% forage + 25% concentrate + 25% Bangun-bangun leaf biscuits, P2 = 50% forage + 50% Bangun-bangun leaf biscuits. Parameters observed is specific gravity, dry matter, protein, fat and acidity of milk. Results study show that there was no difference of all treatments of the parameters. However, there was an indication that treatment with provision of 50% forage + 25% concentrate + 25% Bangun-bangun leaf biscuits (*Coleus amboinicus Lour*) has better values on milk dry matter, and protein content.

**Keywords:** Feed Biscuits, Bangun-bangun Leaf (*Coleus amboinicus Lour*), Milk quality, Sapera goat, Specific gravity
**Introductions**

Milk is a very high quality food, its composition is ideal and has nutrients needed by the human body. Popular milk circulating in the market is cow's milk. However goat milk now already known and there is an increasing demand on it. This is related with its quality such as a protein content which is above the protein content of cow's milk. Goat milk also have lots efficacy like good digestibility, low allergenicity, its chemical composition is close to human milk than cow milk (Raty et al., 2017).

There are several dairy goats that have been cultivated in Indonesia, one of which is a goat results from crossing Saanen (type dairy) and goat Crossbreed Etawa (type meat and dairy), which is often called as goat Sapera. Sapera began to be kept a lot in North Sumatra Province.

Lots factor which affect the quality and production of milk produced by goat, like feed, genetics, environment, lactation, and management (Rosiartio et al., 2015) The feed factor is an important factor to improve milk quality and also increase the amount of milk production in dairy goats. Quality feed provides high milk nutrients and increasing the quality too. In an effort to improve the quality and production of goat milk, it is necessary to provide additional feed that can increase this, one of the feed ingredients that can be utilized is the leaves of Bangun-bangun (*Coleus amboinicus* Lour).

Bangun-bangun leaves (*Coleus amboinicus* Lour) contain lactagagum which plays a role in increasing the rate of secretion and increasing milk production (Syarief et al., 2014). In addition, the leaves of this plant also contain various active compounds that function as galactagogics that can modulate lactogenesis and lactation hormones (Iwansyah et al., 2017). The leaves also contain phytochemical components of alkaloids, sterols, triterpenoids, flavanoids, and tannins. Therefore, in this study, the leaves of Bangun-bangun (*Coleus amboinicus* Lour) is the material for biscuits and the biscuits used as additional feed for Sapera goats to improve milk quality.
Materials and Methods

Materials

Nine Sapera goats were used as research objects. Bangun-bangun leaves are made into biscuits. Drinking water is given ad libitum.

Methods

The research method used a completely randomized design (CRD) and consisted of 3 treatments and 3 replications:

- P0 = 50% forage + 50% concentrate;
- P1 = 50% forage + 25% concentrate + 25% Bangun-bangun leaf biscuits;
- P2 = 50% forage + 50% Bangun-bangun leaf biscuits.

Treatment Description:

Forage;  
P0 = (10% of body weight) x 50% treatment  
P1 = (10% of body weight) x 50% treatment  
P2 = (10% of body weight) x 50% treatment

Biscuits;  
P1 = (3% requirement of body weight) x 25% treatment  
P2 = (Need 3% of body weight) x 50% treatment

Concentrate;  
P0 = (3% requirement of body weight) x 50 treatments  
P1 = (Needs 3% of body weight) x 25% treatment.

Bangun- Bangun Leaf Biscuits

Procedures

Firstly, wash the leaves of Bangun-bangun with clean water then drain then manual leaf enumeration with a knife. Discovering the leaves of Bangun-bangun under the sun until the water content is below 14%. Mixing of Bangun-bangun leaves with other feed ingredients such as Milled Corn, Rice Bran, Soybean Meal, Premix, Salt and Molasses. Mixing is carried out until all the ingredients are evenly mixed (homogeneous). Shaping the ingredients into feed biscuit by inserting ingredients that have been evenly mixed (homogeneous) into a cylindrical mold with a diameter of 7.5 cm and 3 cm thick and pressed manually. Bake the biscuits for 60 minutes at 100°C. Cooling the biscuits that have been baked by aerating in the oven so that the temperature of the biscuits reaches room temperature. Packaging of biscuits using plastic packaging to make it easier to carry or move, increase shelf life and maintain the quality of biscuits.
Parameter Observed

Specific Gravity
Specific gravity in milk can be determined with lactodensimeter. Milk is measured in a glass measuring using 250-500 ml, after that hydrometer milk soaked on glass measuring in temperature room (±27.2 °C). Specific gravity milk only can be measured after three hours of milking or on milk with temperature 20-30°C, because milk stable in this circumstance. Thus is the formula of specific gravity:

\[ BJ = 1 + \text{scale}/100 + (27.5 - T) \times 0.0002 \]

Description:
- \( T \) = Temperature
- \( BJ \) = Specific Gravity

Milk dry matter content
Measuring the dry matter content in milk can be done using Fleischman’s formula (Indonesian National Standardization, 1999):

\[ \text{Dry Matter} = 1.23 L + 2.71 \times 100 \text{ (bj - 1) / bj} \]

Description:
- \( BJ \) = Specific gravity of milk
- \( L \) = Milk fat

Milk Fat content
Milk fat content is determined as following: 10.75 ml milk placed in butyrometer. Prepare 10 ml sour sulfate with concentration 91-92% then insert on butyrometer. Insert 1 ml amil alcohol to in butyrometer. Butyrometer closed and shaken slowly form number eight until ingredients in butyrometer mixed flat. Butyrometer then placed in water bath on temperature 65-70°C during 10 minute. Butyrometer then centrifuged on 1200 rpm. Butyrometer which centrifuged placed in water bath for 5 minutes. After 5 minutes, free plug rubber of butyrometer slowly to known the scale of fat (Indonesian National Standardization, 1999).

Milk Protein
Milk proteins content can be determined with titration formaline method (Indonesian National Standardization, 1999). The method is by titrating a mixture in glass chemistry of 10 ml milk + 0.4 ml solution potassium oxalate and 3 drops phenolphthalein 1% with solution NaOH until milk color become slightly red. This slightly red milk then was added with 2 ml formalin 40 % which caused the color of milk become white. The titration is repeated several times. Volume
titration noted and get the protein content. The formula:

\[ \text{Protein content (\%) = (a - b) x 1.95} \]

Description: 1.95 = protein factor for goat's milk

**pH of Milk**

Measuring the acidity of milk using a pH meter using a buffer solution of pH 4 and 7 as initial preparation. A sample of 10 ml was taken and the electrodes were cleaned using distilled water. The electrode is dried with a tissue paper and then immersed in the sample. The electrode is left in the sample for a certain amount of time. The reading value is determined when the pH meter has stabilized.

**Results and Discussion**

**Specific Gravity of Milk**

Table 1 Average specific gravity of Sapera goat milk

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Replication</th>
<th>Total</th>
<th>Mean ± sd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U1</td>
<td>U2</td>
<td>U3</td>
</tr>
<tr>
<td>P0</td>
<td>1.0411</td>
<td>1.0302</td>
<td>1.0284</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>1.0292</td>
<td>1.0351</td>
<td>1.0403</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>1.0319</td>
<td>1.0332</td>
<td>1.0326</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

sd: standard deviation

The results of the analysis in the ANOVA of Table 1 shows that the administration of Bangun-bangun leaf biscuits to Sapera goats was not significantly different from the specific gravity of other treatments (P>0.05). However, the results of this study indicate that the value of the specific gravity of Sapera goat's milk is above the specific gravity of goat's milk which has been determined by SNI 01-3141-1998 (Indonesian National Standardization 1998), with a minimum specific gravity value of 1.0280. These results indicate that the specific gravity of Sapera goat milk is good and the content of the milk is concentrated. According to Rachmawan (2021) the greater the specific gravity, the thicker the milk. Feeding Bangun-bangun leaf biscuits to Sapera goats had no effect on specific gravity because other factors contained in milk actually affect its specific gravity, especially milk fat. The component of milk that most influences specific gravity is fat (Riski, 2016). The higher the fat content, the higher the density of milk.
### Milk Dry Matter

Table 2. Average dry matter of Sapera goat milk

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Total</th>
<th>Mean ± sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>14.2027</td>
<td>14.6014</td>
<td>14.4331</td>
<td>43.2372</td>
<td>14.4124±0.8152</td>
</tr>
<tr>
<td>P1</td>
<td>14.1572</td>
<td>14.6413</td>
<td>14.6225</td>
<td>43.421</td>
<td>14.4736±0.8788</td>
</tr>
<tr>
<td>P2</td>
<td>15.2794</td>
<td>15.7343</td>
<td>16.8156</td>
<td>47.8293</td>
<td>15.9431±0.6442</td>
</tr>
</tbody>
</table>

sd: standard deviation; tn: not real

The results of the analysis in the ANOVA of Table 2 show that the administration of Bangun-bangun leaf biscuits to Sapera goats was not significantly different from the dry matter of Sapera goat's milk (P>0.05). The dry matter value of Sapera goat milk in the table above is higher than that reported by Aritonang (2017) who found by his research that the dry matter content of milk was 13.10%. The dry matter exceeds the minimum standard of fresh milk dry matter set by SNI 01-3141-1998 of 13.00% (Indonesian National Standardization, 1998). This fact indicates that the quality of Sapera goat's milk which was given forage, concentrate, and Bangun-bangun leaf biscuits was better because the higher the dry matter content of the milk, the better the quality of the milk. There is no difference of treatment Bangun-bangun leaf biscuits probably the feed quality of the three treatments was not much different. The goat breeders can make the biscuits themselves, then the biscuit treatments should be considered to replace the concentrate treatment where concentrates are generally purchased commercially. Actually, Bangun-bangun leaf which consume by women in North Sumatera whom breasfeed her baby, her milk used to be incrased and so did in this study. Parameter on milk production which was taken by other fellow team of this study show an increased on milk production by adminitration of Bangun-bangun leaf biscuit.
Milk Fat

Table 3. Sapera Goat Milk Fat Average

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Test</th>
<th>Total</th>
<th>Average±sd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U1</td>
<td>U2</td>
<td>U3</td>
</tr>
<tr>
<td>P0</td>
<td>5.1676</td>
<td>5.4529</td>
<td>5.3241</td>
</tr>
<tr>
<td>P1</td>
<td>5.2654</td>
<td>5.3175</td>
<td>5.2932</td>
</tr>
<tr>
<td>P2</td>
<td>6.9122</td>
<td>6.8154</td>
<td>6.4613</td>
</tr>
</tbody>
</table>

sd: standard deviation

The results of the analysis in the ANOVA table above show that the administration of Bangun-bangun leaf biscuits to Sapera goats was not significantly different from the milk fat of Sapera goats which was given concentrate (P>0.05). The milk fat content obtained in this study ranged from 5.1676 – 6.9122. This is in accordance with what was reported Praharani et al., (2013) that the fat content found in goat's milk ranges from 4-7.30. The results of this study also met the minimum fresh milk fat standards set by SNI 01-3141-1998 with a minimum weight value of 3.0% milk fat (Indonesian National Standardization, 1998). Therefore, the results of this study are still normal.

The difference was not significant in the treatment because all treatments contain good nutritional quality. Concentrate and biscuits caused an increase in VFA production and decreased acetic acid production. Acetic acid is the raw material for forming various fatty acids and milk fatty acids. However, there is a tendency that the treatment with Wake Up Biscuits has a better fat content. Bangun-bangun leaf contain the lactogenic properties which stimulating the hormone prolactin (PRL) and growth hormone (GH). Lactogum can stimulate the production of PRL and GH hormones (Xu-dong et al., 2012). Milk fat is the part of milk that is most easily affected by changes in the nutritional composition of animal feed (Chilliard, & Ferlay, 2007)(Sofriani, 2012). The fat content of milk in ruminants including goats is strongly influenced by factors such as feed, animal species, population, genes, gestational age, lactation period, and environment.
Milk Protein

Table 4. Sapera Goat Milk Protein Average

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Test</th>
<th>Total</th>
<th>Average±sd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U1</td>
<td>U2</td>
<td>U3</td>
</tr>
<tr>
<td>P0</td>
<td>3.9212</td>
<td>3.7356</td>
<td>3.8443</td>
</tr>
<tr>
<td>P1</td>
<td>3.9223</td>
<td>3.9562</td>
<td>3.9218</td>
</tr>
<tr>
<td>P2</td>
<td>3.9941</td>
<td>4.7919</td>
<td>4.8769</td>
</tr>
</tbody>
</table>

sd: standard deviation

The results of the analysis in the ANOVA table above show that the administration of Bangun-bangun leaf biscuits to Sapera goats was not significantly different from the milk protein of Sapera goats. (P>0.05). Milk protein levels obtained in this study ranged from 3.7356-4.8769. This is in accordance with what was reported Praharani et al., (2013) that the average protein content found in goat’s milk ranges from 3.83 to 4.55. The results of this study also met the minimum standards for fresh milk protein stipulated by SNI 01-3141-1998 with a minimum value of 2.7 % milk protein (Indonesian National Standardization, 1998). There was a tendency that numerically the highest mean protein content was found in P3 treatment with forage and Bangun-bangun leaf biscuits, namely: 4.5543, and the lowest in the P0 treatment with forage and concentrate feed, namely: 3.8337. Eventhough combination of forage with high concentration of proteins can achieved a good protein content of milk (Zain,2013). However, this study showed that administration of biscuit bangun-bangun leaf made a better protein content.

Milk pH

Table 5. The average pH of Sapera Goat Milk

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Test</th>
<th>Test</th>
<th>Total</th>
<th>Average±sd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U1</td>
<td>U2</td>
<td>U3</td>
<td></td>
</tr>
<tr>
<td>P0</td>
<td>6.5792</td>
<td>6.7016</td>
<td>6.6651</td>
<td>19.9459</td>
</tr>
<tr>
<td>P1</td>
<td>6.6943</td>
<td>6.7022</td>
<td>6.6714</td>
<td>20.0679</td>
</tr>
</tbody>
</table>

sd: standard deviation
The results of the analysis in the ANOVA table above show that the administration of Bangun-bangun leaf biscuits to Sapera goats was not significantly different from the pH of Sapera goat's milk (P>0.05). The acidity or pH level of milk obtained in this study is 6.5799 - 6.6893. This is still in accordance with what was reported by Praharani et al., (2013) that the pH found in goat's milk ranges from 6.64-6.69. This shows that the acidity level in goat's milk has a good pH level, because the pH value of milk is in accordance with SNI standards which range from 6-7 (Indonesian National Standardization, 1998). Acidity level in milk usually 6.5-6.7. When the acidity level of milk under 6 probably this is related with bacteria contamination (Suardana & Swacita. 2009)

**Conclusion**

Based on the research that has been done, it can be concluded that the feeding of Bangun-bangun leaf biscuits has a good effect on the quality of milk for sapera goats. The milk fulfills the minimum standard of SNI milk quality.

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