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Potency of Combination of Palm Kernel Meal and Katuk Leaf Powder to Improve the Production Performance of Peranakan Etawa (PE) Goat: Toward a Strategy for Quality Control of Meat Using “CGE” Concept

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ABSTRACT

This research was aimed to study the potency of supplementation of a combination of palm kernel meal and katuk leaf powder (Sauropus androgynus L. Merr) to the production performance in PE goat. The final target of this study is to develop a strategy for quality control of meat using a “clean, green, and ethical” (CGE) concept of technology. This study were used 20 male PE goat at aged of ± 1.5 years and weight of 15-20 kg. The result showed that the supplementation of BISKAT was induced a higher level of testosterone in male PE goat. In conclusion, testosterone levels of PE goat tends to increase after given a combination of palm kernel meal and katuk leaf powder. Therefore, the technique used in this research might direct us to to develop a strategy for quality control of meat product in livestock using a “clean, green, and ethical” (CGE) concept of technology in the future.

INTRODUCTION

Nowadays, utilization of herbal product for improving livestock production has received more attention. It is because the perspective of some consumers has been changed to a clean,
green, and ethical (CGE) concept for animal products [1]. Although, there are also some advance animal production technologies available, but the consumers prefer for a safe production system, both for animal welfare and human health aspects [2, 3]. In addition, the animal industry would also prefer a low technology and low cost of production system. Therefore, in response to that changes in society preference, then using natural method, such as herbal product, is an alternative for improving animal production, including for increasing their reproductive efficiency [1].

An example of natural method for stimulation of production performance in livestock animals is a utilization of palm kernel meal and katuk leaf powder (Sauropus androgynus L. Merr). The administration of palm kernel meal could increased the body weight of cattle and goat to 0.5-1.2 kg/day and 52-62 g/day, subsequently [4]. Furthermore, Yaakub et al., [5] reported that feeding goat and sheep with palm kernel meal could also increased their internal activity of testis, but has no effect on libido, mating behavior, and semen quality.

On the other hand, katuk leaf supplementation in poultry has showed an improvement in their reproductive performance [6, 7, 8, 9]. Furthermore, Ferasyi et al. [10] reported that a supplementation of katuk leaves as powder or alcohol extract increases the production of spermatids and spermatocytes in the seminiferous tubule of male Kacang Goats. However, a greater effect is obtained when the goats fed with powder.

Interestingly, both palm kernel meal and katuk leaf powder are known could affect the production of volatile fatty acids (VFA) in farm animals [11, 12]. VFA is a metabolic substance produced in animal body and hypothesized plays an important role in increasing reproductive system [13]. A study conducted by Boukhliq et al., [14, 15] showed that the supplementation of VFA in male sheep could increases the activity of reproductive endocrinology axis, which comprises of hypothalamus, pituitary gland, and testis. Therefore, based on several studies above we studied the potency of combination of palm kernel meal and katuk leaf powder to improve the reproduction performance of peranakan etawa (PE) goat. Especially, an aspect focused in this study was to the increase of testosterone levels in PE Goat. It is aimed to obtain a preliminary result toward a strategy for quality control of meat using “CGE” concept in the future.
MATERIALS AND METHODS

Preparation of Palm Kernel Meal and Katuk Leaf Powder

Raw palm kernel meal (hereafter, BIS) waste were collected from local palm oil processing plant in North Sumatera and used for animal treatment in this study. Then, the production of powder of katuk leaves (hereafter, KAT) was conducted by modified the processing method of Suprayogi [16] by Ferasyi et al. [10].

Animal Treatment

A total of 20 male PE goats at ± 1.5 years old were used in this study. Initially, all animals were acclimatized for 14 days. Every day, they were fed native pasture and grass as well as access to water ad libitum. Then, after passed acclimatization period, by using a Complete Random Design (CRD) approach, all goats were placed randomly in individual cage, and divided into 4 different treatment groups (Each group comprised of 5 goats). The groups were one control group (P0) and three different treatment groups (P1, P2, and P3), as follow:

1. Control group (P0), which was given distillated water.
2. First treatment group (P1), which was administered with only BIS at 100 g/day per goat.
3. Second treatment group (P2), which was given a combination of BIS and KAT at 100 g/day and 15 g/day per goat, subsequently.
4. Third treatment group (P3), which was given only KAT at 15 g/day per goat.

All animals were given treatments by oral administration twice a day in the morning (at 07:30 am) and in the afternoon (at 16:30 pm), for 35 days, consecutively. Finally, on day 36th blood sample were collected from Jugular vein of each goat for evaluation of testosterone level.

Evaluation of Testosterone Level

The estimation of total testosterone level was measured by using ELISA technique. Initially, a standard solution, sample, and control was filled in each well plate and mixed with 200 μl conjugate reagent of testosterone. This solution was incubated for 120 min at room temperature. Then, it was stirred as fast as possible to take out the content in the well plate. Next, the well plate was rinse for 3 times by adding cleaning solution of 400 μl in each of them. Then, in each well plate was filled with 100 μl of substrate solution and incubated at 15 min under room
temperature. Enzymatic reaction was stopped by adding a 50 μl of stop solution into each well. The absorbance value was read from ELISA reader after 10 min, at absorbance of 450±10 nm.

**Data Analysis**

Data obtained from this study were analyzed using a one-way ANOVA by SPSS for windows version 16.

**RESULTS AND DISCUSSION**

This is the first report, as far as we know, of the potency of combination of BIS and KAT to improve the reproduction performance of PE goat. Especially, an aspect focused in this study was to the increase of testosterone levels in this small ruminant. Previously, most studies have tested the effect of supplementation of BIS and KAT separately. For KAT itself, most of studies were focused on its effect on the reproductive system of poultry [7, 9, 17].

The results of our study showed that in average the level of testosterone is higher in the treatment group of combination of BIS and KAT (Table 1). On the other hand, the level of testosterone is slightly lower in control group. Although, the difference is not significantly difference by statistical analysis (P>0,05), this results showed a trend to induce an increase of testosterone production after supplementation with BIS-KAT as compared to when it given separately.

Table 1. Mean level of testosterone in male PE goat in control and treatment groups.

<table>
<thead>
<tr>
<th>Treatment groups</th>
<th>Testosterone (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>13.20±3.96a</td>
</tr>
<tr>
<td>P1</td>
<td>13.60±4.15a</td>
</tr>
<tr>
<td>P2</td>
<td>14.40±3.64a</td>
</tr>
<tr>
<td>P3</td>
<td>13.40±2.60a</td>
</tr>
</tbody>
</table>

Note: the same superscript in the same column indicated not significantly difference (P>0,05).

P0, control group given distillated water; P1, administered with only BIS at 100 g/day per goat; P2, given a combination of BIS and KAT at 100 g/day and 15 g/day per goat; and, P3, given only KAT at 15 g/day per goat. All animals were given treatments by oral administration twice a day in the morning (at 07:30 am) and in the afternoon (at 16:30 pm), for 35 days, consecutively.

The results above indicated that the supplementation of BIS-KAT has a potency to affect the process of spermatogenesis in PE goat. Several previous studies have reported that the
administration of BIS itself could induce an increase of fertility in dairy cow and semen quality [5]. Then, Ferasyi et al. [10] has suggested that the production of spermatids and spermatocytes in the testis of local kacang goat is increased after given powder of katuk leaves. Interestingly, the combination of their supplementation in our study could clinically increase the level of testosterone higher than given them separately.

Possibly, the increase of testosterone level after supplementation of BIS-KAT in this study is related to the increase of production of VFA. Both of BIS and KAT have been reported could stimulate the production of VFA in small ruminant [12, 16]. VFA supplementation in small ruminant could increase the activity in testis, including testosterone production [14, 15]. Therefore, a further study is needed to ensure that the increase of testosterone production is affected by an increase of VFA after supplementation of combination of BIS-KAT in small ruminant.

Importantly, the technique used in this research could allow us to apply a fetal programming to livestock production. This approach might direct us, for example, to develop a strategy for quality control of meat product in livestock that fulfill a “clean, green, and ethical” (CGE) concept of technology in the future. Since, the safety production is initiated at early stage of animal reproduction to obtain safety and healthy animal food products afterward. In addition, the application of that concept will results in low environmental impact (‘green’) and favouring animal welfare (‘ethical’) [1].

CONCLUSION

We concluded that the administration of combination of BIS-KAT has a potency to increase the production of testosterone in PE goat. Then, it might direct us to develop a strategy for quality control of meat product in livestock that fulfill a “clean, green, and ethical” (CGE) concept of technology in the future.

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