THE EFFECT OF CALF STARTER RATION FOR PRE-WEANING ONGOLE GRADE (PO) CALVES ON BODY WEIGHT GAIN

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ABSTRACT

The objective of study was to determine the effect of calf starter in the pre-weaning calves against the daily body weight gain. Twenty Ongole grade (PO) calves age of 1 month divided into 4 treatment groups of feed, 5 calves for each treatment. Treatment (P1) fed with extra soybean groats; (P2) soybean groats 50% + Gliricidia 50%; (P3) soybean groats 50% + katul 50%; (P4) soybean groats 50%+ roti afkir 50%. Calf starter was given at age 1 month to 3 months. Observation was carried out on calves daily weight gain. This experiment was designed in Completely Randomized Design. Data was analyzed by analysis of variance and continued Least Significant Difference Test. Statistical analysis showed that feed of (P <0.05) significantly affected the daily weight gain of the calves. Results of the study can be concluded that calf starter with soya groats provide the best daily weight gain of pre-weaning calf.

Keywords: pre-weaning calf, calf starter

INTRODUCTION

Growth, health and performance of calves depend on many environmental, management and feeding factors. This short paper of starter feed for calves of dairy breeds, pre-weaning. One measure of success in breeding beef cattle is a daily body weight gain pre-weaning calf. The Government through the Indonesian Center for Animal Research and Development (ICARD) has targeted daily weight gain pre-weaning calves was 0.4 kg Ongole grade (PO) cattle, 0.3 kg Bali cows and
One effort to increase body weight daily to match the set target is the improvement of nutrient consumed in pre-weaning calf. Nutrient deficiency in this period, as well as stunted growth will also lead to lower immunity and are susceptible to diseases that lead to the death of the calf (Sharma and Jain, 1979). Improvement of nutrient consumed for calves can be done by giving milk substitutes to overcome the lack of mother's milk or the provision of calf starter to increase nutrient intake for calves. Intake of starter rom young calves depends first of all on the quantity of consumed milk or milk replace, but also on composition, palatability and physical form of starter feeds (Fokkink et al., 2010; Pezhveh et al., 2014).

Calf starter is concentrated to the initial growth nutrient dense, low crude fiber and soft textured. Calf Starter granting a transition period of consumption of milk with dry feed intake. Calf starter is very important for a healthy rumen development and growth of a good body, so the success in this period will determine the growth of calves in the next period. Several researchers have recommended the addition of ground hay to the starter for optimum rumen development (Anderson et al., 1987; Beharka et al., 1998; Coverdale et al., 2004; Greenwood et al., 1997; Waterman 2005). However some researcher and extensionists (Heinrichs and Lesmeister 2000) reported that hay is not recommended for calves until weaning time when calves weaned 3-6 weeks, since it is less energy dense per unit than grain.

Feed ingredients to prepare, besides the high quality of calf starter, should also be available in the market at relatively low prices. In order to generate the increase in calf daily gain of 0.4 kg, feed must contain protein 22.4%, while for daily weight gain of 0.6 kg is needed protein in the feed of 26.6% and for body weight daily 0.8 kg is needed protein in feed 27.4% (Van Amburgh and Drakley, 2005). Trials by Akayezu et al. (1994), Luchini et al. (1991), and Hill et al. (2007) substantiate that 18% CP diets are adequate.

One of the feed material of high quality and the price is relatively cheap soya groats. Groats soya is the residue of sorting soya consumption, usually in the form of worm-eaten leftover soybean, seed is not full or immature seed. Soy nutrient content is very high, with a protein content of 40.3%, 16.7% fat and 3.2% fiber (Hermana, et al., 1996). The protein sources in starter feeds are also important for the growth and development of calves. Soybean meal (SBM) is one of the most commonly used protein sources in calf starters (Davis and Drackley, 1998; Miller-Cushon et al., 2014a), because calves prefer soybean meal over sunflower meal, dry distillers grain with solubles (DDGs) or canola meal (Montoro et al., 2010; Miller-Cushon et al., 2014a; Miller-Cushon et al., 2014b). The use of soybean meal as a protein source in calf starter at the age of 4 days calf can be weaned at the age of 45 days and resulted in both the performance at the age of 6 months (Yusof et al., 1998).

Other feed ingredients are widely available on the market including the bran. Rice bran is a byproduct of the rice mills with a crude protein content of 11.19%, fat 11.22% 13.85% crude fiber and energy metabolism of 1630 kcal / kg (Rizal et al., 2005). Other food sources that contain high nutritional is **Gliricidia sepium**. **Gliricidia sepium** is a plant that is easy to grow quickly in the tropics. **Gliricidia sepium** leaves the crude protein content is as high as 24.22% (Bakrie, 1996), whereas the results Munier (2010), **Gliricidia sepium** protein content of 18.3%, 38.2% crude fiber and crude fat 2.8%.

Expired-bread or toast rest of the market is pretty much available in the market. Nutrient content is quite high and the prices are relatively cheap, allowing the expired-bread become one of the feed material. Chalimi et al. (2010) states that the energy digestibility of culled better bread than rice bran and feasible given as feed for Ongole grade. The protein content of bread rejects BETN 12.63% and 78.42% (Diyatmoko et al., 2010), while according to Agus, et al. (2005) rejects the bread protein content of 5.1% and 91.4% organic ingredients.

The aim of this study was to determine daily weight gain and feed cost per weight increase in pre-weaning Ongole grade calf given calf starter composed of different materials.

**MATERIALS AND METHODS**

Twenty Ongole grade (PO) calves age of 1 month is divided into 4 treatment of feed.
Treatment ration (P1) soya groats 100%; (P2) soya groats 50% + gliricidia 50%; (P3) groats bran soybeans 50% + 50%; (P4) groats soybeans 50% + 50% expired-bread. The nutrient content of the feed materials making up rations is shown in Table 1. The content of nutritional ration in each treatment is shown in Table 2. The supplementary feed is given as much as 0.5 kg/day at the age of 1-2 months and 1 kg/day at age 2-3 month. Soya groats and Gliricidia leaves before boiling is given in calves done beforehand. During the observation, calves kept with their mothers and left calf suckling mother. Weight of calves weighed at the age of 1 month and 3 months of age. Daily weight gain is calculated using the formula:

\[ G = \frac{(W2 - W1)}{60} \]

Where
- \( G \) : Daily weight gain
- \( W2 \) : 3 months old calf weight (kg)
- \( W1 \) : The weight of calves aged 1 month (kg)

Daily weight gain data were analyzed by analysis of variance, if there are differences continued with Least Significant Difference Test (Steel and Torrie, 1981). To determine the cost of calf starter most efficient treatment then calculated feed cost per gain (cost of feed for every increase in body weight) of each treatment. Feed cost per gain is calculated using the formula:

\[ FC = \frac{(TC \times P)}{I} \]

Where
- \( FC \) : Feed cost per gain
- \( TC \) : Total consumption of calf starter for 60 days (kg)
- \( P \) : price of calf starter (IDR/kg)
- \( I \) : The increase in body weight during the 60 days (kg)

**RESULTS AND DISCUSSION**

The development of body weight

Calf weight at 3 months showed that treatment P1 (100% soya groats) is higher (93.6 kg), compared to P2 (soybean groats 50% + gliricidia 50%) amounted to 78.6 kg; P3 (soybean groats 50% + rice bran 50%) amounted to 81.6 kg and P4 (soybean groats 50% + rejected bread 50%) of 75.4 kg (Figure 1). Feed by using 100%

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### Table 1. Nutrient Content of Feed Ingredients for Calf Starter

<table>
<thead>
<tr>
<th>Feed Ingredients</th>
<th>Crude Protein</th>
<th>Crude Fat</th>
<th>Crude Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soya groats*</td>
<td>30.9</td>
<td>9.4</td>
<td>14.4</td>
</tr>
<tr>
<td>Bran*</td>
<td>9.8</td>
<td>7.2</td>
<td>17.2</td>
</tr>
<tr>
<td>Gliricidia**</td>
<td>18.3</td>
<td>2.8</td>
<td>38.2</td>
</tr>
<tr>
<td>Expired-bread*</td>
<td>6.1</td>
<td>7.5</td>
<td>4.7</td>
</tr>
</tbody>
</table>

* Laboratory analysis by Chem-mix Pratama, Yogyakarta

** Munier (2010)

### Table 2. Calf Starter Nutrient by Ration Treatment

<table>
<thead>
<tr>
<th>Components</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein (%)</td>
<td>30.9</td>
<td>24.6</td>
<td>20.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Crude Fat (%)</td>
<td>9.4</td>
<td>6.1</td>
<td>8.3</td>
<td>8.5</td>
</tr>
<tr>
<td>Crude Fiber (%)</td>
<td>14.4</td>
<td>26.3</td>
<td>15.8</td>
<td>9.6</td>
</tr>
</tbody>
</table>

P1 = 100% soya groats; P2 = soya groats 50% + gliricidia 50%; P3 = soya groats 50% + rice bran 50%; P4 = soya groats 50%+ expired bread 50%
soya groats it protein content is highest (30.9%) compared to other treatments, so the calf is also the highest growth.

The growth of the calf’s body weight is influenced by feed intake and nutrient content of feed. By knowing the feed intake and nutrient content of feed can be seen the consumption of nutrients. Feed intake (dry matter), crude protein, crude lipid and crude fiber are listed in Table 3. Table 3 shows that treatment P1 protein consumption is highest (11.83 kg) compared to the P2 (9.68 kg) treatment, P3 (7.91 kg) and P4 (7.25 kg). Likewise, crude fat consumption, amounting to 3.60 kg treatment P1 is also more than the treatment P2 (2.40 kg); P3 (3.23 kg) and P4 (3.33 kg), this led to the growth of the calf on the treatment P1 is higher than other treatments.

The growth of the calf between the treatment P1, P2 and P3 are not different, because nutrient consumption is almost the same. Treatment P2 consumption of 9.68 kg crude protein, higher than treatment P3 and P4 respectively amounted to 7.91 kg and 7.25 kg, but it is accompanied by the consumption of crude fat P2 lower (2.40 kg) compared to P3 and P4 are respectively of 3.23 kg and 3.33 kg. Similarly, consumption of crude fiber in treatment P2 higher (10.34 kg) than treatment P3 and P4 respectively amounted to 6.15 kg and 3.76 kg. This resulted in the growth of the calf between the treatment P1, P2 and P3 are the same.

![Graph of body weight development of the calf by calf starter with different materials](image)

Figure 1. Graph of body weight development of the calf by calf starter with different materials
Symbols represent 100% soybean groats (●), soybean groats 50% + gliricidia 50% (■), soybean groats 50% + rice bran 50% (▲) and soybean groats 50% + expired-bread 50% (×)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Consumption of Dry Matter (kg)</th>
<th>Consumption of nutrients (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dry Matter (kg)</td>
<td>Crude Protein (kg)</td>
</tr>
<tr>
<td>P1</td>
<td>38.29</td>
<td>11.83</td>
</tr>
<tr>
<td>P2</td>
<td>39.33</td>
<td>9.68</td>
</tr>
<tr>
<td>P3</td>
<td>38.95</td>
<td>7.91</td>
</tr>
<tr>
<td>P4</td>
<td>39.17</td>
<td>7.25</td>
</tr>
</tbody>
</table>

P1 = 100% soya groats; P2 = soya groats 50% + gliricidia 50%; P3 = soya groats 50% + rice bran 50%; P4 = soya groats 50%+ expired bread 50%

Table 3. Consumption of Dry Matter, Crude Protein, Crude Fat and Crude Fiber
### Daily Weight Gain

The mean daily weight gain calf row-succession was 0.70 kg (P1); 0.53 kg (P2); 0.49 kg (P3) and 0.57 kg (P4) (Table 4). Statistical analysis showed that the P1 (soybean groats 100%) has the most daily weight gain higher than the other treatments (P <0.05), whereas among treatments P2, P3 and P4 showed no significant differences. Body weight gain were higher in treatment P1 due to the high nutrient content, especially the protein content is 30.9%, while the protein content of treatment P2, P3 and P4 respectively 24.6%; 20.3% and 18.5% (Table 2). High protein content in the treatment P1 is also followed by the consumption of crude protein and crude fat treatment is higher than P2, P3 and P4 (Table 3).

Calves daily weight gain of all the treatment have been above the government's target. The Government through the Indonesian center for Animal Research and Development target body weight daily pre-weaning calves to cows PO was 0.4 kg (Badan Litbang Pertanian, 2007). This suggests that to achieve the targets that have been set by the Government, farmers can choose one of four kinds of diets in these studies.

### Calf Feed Costs for Body Weight Gain

Total feed intake 0.75 kg/head/day, and results of calculation of calf feed costs required for each increase of 1 kg of body weight (without taking into account the condition of the parent) treatment P1, P2, P3 and P4 respectively - were IDR 4,285; IDR 3,537; IDR 4,591 and IDR 3,970 (Table 5). The data in Table 5 shows that the combination of soya groats and Gliricidia (P2) is the most efficient. This is indicated by the cheapest feed costs of IDR 3,537 for every 1 kg increase in body weight. This is because the price of the cheapest feed ration price compared to other treatments, but still shows a relatively high increase in body weight (31.8 kg). Gliricidia nutrient content is quite high and low prices resulted in a combination of soya groats and gliricidia most feed efficient than other treatments.

### Table 4. Daily Gain of Ongole Grade Calf Fed on Different Treatment

<table>
<thead>
<tr>
<th>Treatments</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weights at month 1 (kg)</td>
<td>51.6</td>
<td>46.8</td>
<td>52.2</td>
<td>41.4</td>
</tr>
<tr>
<td>Weights at month 3 (kg)</td>
<td>93.6</td>
<td>78.6</td>
<td>81.6</td>
<td>75.4</td>
</tr>
<tr>
<td>Daily weight gain, (kg/day)</td>
<td>0.70&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.53&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.49&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.57&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>ab</sup> superscripts in the same column indicate significant differences (P <0.05)

**P1** = 100% soya groats; **P2** = soya groats 50% + gliricidia 50%; **P3** = soya groats 50% + rice bran 50%; **P4** = soya groats 50% + expired bread 50%

### Table 5. Feed Cost for Increasing of a Kilogram of Calf Body Weight

<table>
<thead>
<tr>
<th>Items</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight gain of age 1-3 months (kg)</td>
<td>P1</td>
</tr>
<tr>
<td>Feed prices (IDR/kg)</td>
<td>4,285</td>
</tr>
<tr>
<td>Feed cost for an increasing of body weight (IDR/kg)</td>
<td>180,000</td>
</tr>
</tbody>
</table>

**P1** = Soya Groats 100%; **P2** = Soya Groats 50% + Gliricidia 50%; **P3** = Soya Groats 50% + rice bran 50%; **P4** = Soya Groats 50% + Expired-bread 50%
CONCLUSION

The use of Soybean Groats in the ration pre-weaning calf (calf starter) shows the daily body weight gain were the highest, but when viewed from an economic standpoint, the combination of soybean groats and Gliricidia leaves are most efficient.

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