Performance of Aceh cattle fed by concentrate with different levels

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Abstract. Aceh cattle are traditionally maintained in smallholder farmers that only rely on forage as a single feed. Concentrate supplementation is then needed to fulfill the nutrients requirement. This study was aimed to measure the performance of Aceh Cattle fed by forage and concentrate as supplementation in different levels. The study was conducted in Livestock Breeding Center for Excellent and Forage Animal Feed (BPTU-HPT) Indrapuri, Aceh using 20 male Aceh Cattle aged 1.5-2.5 years. The cattle were intensively kept for 90 days and grouped based on feeding proportion of forage and concentrate with different levels, i.e., T1=100:0 as a control, T2=70:30, T3=50:50, and T4=30:70 on dry matter-based. The cattle were weighed every month and feed intake was measured. Data were analyzed by one way of ANOVA, followed by Duncan’s New Multiple Range Test. The results showed that feed intake, feed efficiency, body weight gain and average daily gain of T1 was the lowest (P <0.05). The average daily gain of T3 and T4 did not significantly differ. There was a significant difference between T1 and T2. Concentrate supplementation improved the feed intake and growth performances of Aceh Cattle. The best level of concentrate supplementation on forage feed was 50:50.

1. Introduction
Aceh Cattle is one of Indonesia’s local cattle which has been determined by the Ministry of Agriculture of the Republic of Indonesia with a decision Number 2907/Kpts/OT.140/6/2011. Aceh cattle is very potential as a meat producer and well adapted in Aceh Province [1]. This cattle is categorized as small cattle based on body size [2]. The young Aceh cattle have a bodyweight about 130 to 148 kg while adults about 169 to 191 kg [3]. Aceh cattle maintained by smallholder farmers, have body length of about 96.72 to 97.58 cm
and chest girth of 115.40 to 119.80 cm in young cattle, whereas adult cattle have a body length of 107.41 to 119.30 cm and chest girth of 129.33 to 140.66 cm [4].

The feed cost can reach 70% of the total cost of the livestock enterprises. Livestock needs good quality feed to optimize their productivity. Improvement of feed quality is essential, Aceh cattle with rice bran supplementation can produce an average daily gain 0.50 to 0.66 kg/head/day and feed conversion 14.12 to 34.28 [5]. Efforts to increase livestock productivity through high quality feed supplementation will produce high average daily gain and expected to be efficient [6]. Improvement of feed efficiency will increase of farmers profits. However, the concentrate supplementation for Aceh cattle is still rarely done by smallholder farmers because traditional farming system. This research needs to be done to measure the performance of Aceh cattle fed by concentrate supplementation.

2. Materials and method

The research was conducted from May to August 2018 using 20 males Aceh cattle, resulted from the breeding of Livestock Breeding Center for Excellent and Forage Animal Feed (BPTU-HPT) Indrapuri located at Aceh Besar. Aceh cattle were aged of 1.5 to 2.5 years and relatively similar initial body weight used in the study. Aceh cattle were kept intensively in individual housing. Aceh cattle were divided randomly into four treatments based on different forage and concentrates levels, i.e T1(100:0) as a control with feeding by 25 kg forage without any additional commercial concentrate feed, T2 (70:30) feeding by 20 kg forage and 1 kg commercial concentrate feed, T3 (50:50) feeding by 15 kg forage and 2 kg of feed commercial concentrate and T4 (30:70) feeding by 10 kg forage and 3 kg of feed commercial concentrate. Nutrient contents of feeds used in the study is presented in Table 1.

| Nutrient*  | Forage | Concentrate |
|------------|--------|-------------|
| Dry matter (%) | 26.13 | 92.26 |
| Ash (%)      | 8.72  | 7.19        |
| Crude protein (%) | 4.88 | 18.67 |
| Crude fat (%) | 1.62  | 3.87        |
| Crude fiber (%) | 39.81 | 11.50 |
| Organic matter without N (%) | 44.97 | 58.78 |

*Based on proximate analysis at Laboratory of Animal Nutrition, Faculty of Animal Science UGM (2018)

Aceh cattle kept for three months and weighed every month. Gain was calculated by reducing the final body weight with initial body weight. The average daily gain (ADG) calculated by dividing the gain with the period. Feed intake was observed daily by weighing the offered feed minus the leftover feed. Data were statistically analyzed using a one-way analysis (ANOVA) and continued by Duncan Multiple Range Tests (DMRT).

3. Results and discussion

Dry matter intakes (DMI) of Aceh male cattle fed on different forages and concentrate levels is presented in Table 2. The total DMI of forage in the T4 group was the lowest (P <0.05) compared to the other groups. However, DMI of concentrates cannot compare. The results showed that total and daily DMI was significantly (P <0.05) affected by the different levels of concentrate supplementation, the lowest DMI was in the T1, while the T4 did not differ significantly with T2 and T3 groups. The higher level of concentrate in the T4 was not able affecting the total and daily dry DMI. It is in line with [7] stated, that increased levels of concentrates do not always improve the DMI.
Table 2. Feed intake of Aceh cattle fed by forage and concentrate with different level

| Variables | T1(100:0) | T2(70:30) | T3(50:50) | T4 (30:70) |
|-----------|-----------|-----------|-----------|------------|
| Forage (kg) | 342.52b±36.85 | 339.71b±27.10 | 313.86b±23.68 | 203.56a±20.03 |
| Concentrate (kg) | 0.00±0.00 | 83.03±0.00 | 166.07±0.00 | 249.10±0.00 |
| Total (kg) | 342.52a±36.85 | 422.74b±27.10 | 479.93c±23.68 | 452.66b,c±20.03 |
| Daily DMI (kg/d) | 3.76a±0.41 | 4.65b±0.30 | 5.27c±0.26 | 4.97b,c±0.22 |
| Feed efficiency (kg/kg) | 4.52a±1.47 | 9.81b±1.90 | 13.42±2.73 | 13.33±1.10 |

*Non significant
a,b,c Different superscripts denote significant differences between rows (P<0.05)

Growth can be seen by the increase of body weight and body measurements of animals [10]. Table 3 shows that no significant differences in either initial and final body weight. The supplementation of concentrate feed had a significant effect (P <0.05) to improve the growth of male Aceh cattle, in terms of absolute and relative gain and ADG. There was a tendency that the increase of growth performance was in line with the increase of concentrate supplementation level, except for T4. The T3 had the highest (P <0.05) absolute and relatives gain and ADG, while cattle without concentrate supplementation (T1) had the lowest growth (P <0.05). The increase of growth performance as the result of higher concentrate supplementation was almost 3-4 times compared to cattle without supplementation. This study is in line with the previous study [8][9], stated that increased feed intake could improve the ADG.

Table 3. Bodyweight, gain and ADG of Aceh cattle fed by forage and concentrate with different level

| Variables | T1(100:0) | T2(70:30) | T3(50:50) | T4 (30:70) |
|-----------|-----------|-----------|-----------|------------|
| Initial (0 month)ns | 164.96±53.85 | 167.90±39.65 | 167.78±38.84 | 167.98±37.85 |
| Final (3rd month)ns | 180.50±50.11 | 209.52±31.43 | 232.42±27.36 | 228.46±31.43 |
| Absolute gain (kg) | 15.54a±5.36 | 41.64b±9.59 | 64.65c±15.08 | 60.48c±7.36 |
| Relative gain (%) | 10.77a±5.74 | 27.03b±9.59 | 41.86b±19.70 | 38.37b±13.46 |
| Average daily gain (kg) | 0.17a±0.06 | 0.46b±0.10 | 0.72c±0.17 | 0.67c±0.08 |

*Non significant
a,b,c Different superscripts denote significant differences between rows (P<0.05)

The concentrate supplementation with various levels was a significant influence on the ADG of Aceh cattle (0.46 to 0.72 kg/d). Similar to the previous study by [7] that concentrate supplementation significantly improves the ADG of 0.65 kg/d. However, the increase level of the concentrate supplementation does not mean increasing the gain significantly. The evident of the feed efficiency did not significantly differ between T3 and T4 groups. The lower feed conversion ratio and higher feed efficiency ratio will be more profitable because less feed is consumed to achieve optimal products at a particular time [10]. The condition affects the feed cost required to produce one unit of product at a particular time. In further study needs to be calculated the feed cost per gain and income over feed cost.

4. Conclusions
To conclude our findings, the feeding of concentrate feed as a supplement are able to improve the feed intake and growth performance of Aceh cattle. The best level of concentrate supplementation on forage feed is 50:50.

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