Income over feed cost of Aceh cattle fattened with forage and concentrate in different levels

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Abstract. Income over feed cost (IOFC) is needed to evaluate and analysis of beef cattle fattening enterprise. This study aims to determine the IOFC of Aceh cattle fattened with forage and concentrate on different levels. The research was conducted on May-August 2018 in Livestock Breeding Center of Aceh. Twenty males Aceh cattle aged 1.5 to 2.5 years were grouped 4 treatments based on different forage and concentrate levels (T1=100:0, T2=70:30, T3=50:50 and T4=30:70) and intensively kept for 3 months. Average daily gain, feed intake, feed conversion, feed efficiency, feed cost per gain and IOFC were calculated and statistically analyzed by one way of ANOVA, followed by Duncan's New Multiple Range Test. The result showed that concentrate feed increased (P <0.05) the dry matter intake, average daily gain and feed efficiency. The feeding by concentrate (T2, T3, T4) decreased (P <0.05) feed cost per gain Rp.14,894 and increased (P <0.05) IOFC Rp.8,715. The feed efficiency and IOFC of T3 had the highest (P <0.05). The conclude our finding, farmers of Aceh cattle are benefited from feeding concentrate as a supplement in fattening. The best level of concentrate supplementation on forage feed is 50:50.

1. Introduction
Aceh cattle has been maintained for generations and has an important role for rural communities in the economic, social, and cultural aspects of Aceh people. The population of cattle in Aceh is dominated by Aceh breed (84.93% of cattle population) in the smallholder farms level [1]. According to data from [2], the number of slaughtered cattle, beef production, and beef consumption in Aceh always increases from 2013 to 2017. Especially, Aceh has a unique tradition known as meugang. Meugang is a tradition of providing and cooking beef before approaching the Islamic big day celebration. This tradition is usually held three times a year, which is two days before approaching of the Ramadan, Eid-al-Fitr, and Eid al-Adha. Market for Aceh cattle becomes very unique and the demand for beef and the price are drastically increasing, due to Meugang existence. Based on [3] the price range of
beef in normal condition is Rp.100,000-120,000/kg, while during meugang, the price reaches Rp.150,000-170,000/kg. Aceh cattle is very potential as meat producers [4] as well as for fattening practice.

In cattle fattening, we optimizing the meat yield of a cattle with efficient costs. Smallholder farmers usually neglect the feed cost they spend for fattening [5], [6] reported that the feed cost could reach 69.10% of the total cost in the livestock practices at smallholder farms level. To increase the efficiency of beef cattle production is by reducing feed costs and increasing the efficiency of feeding management. [7] stated that feed is an essential element in beef cattle production, limited availability of forages due to land conversion, resulting the low productivity of beef cattle. Farmers in Aceh use forage as a single feed regardless the balance of required nutrients. Forages used in the fattening practice are mostly inadequate in terms of quality and quantity [1]. Therefore, concentrate supplementation is needed to fulfill the nutrients requirement.

Income over feed cost (IOFC) is a concept to find out the business analysis as an early indicator of beef cattle fattening in the short term [8]. The value of IOFC is the difference between income and feed costs. The calculation of IOFC was carried out to determine the economic value of feed to the income of beef cattle farmers. Revenue is a multiplication between livestock production and selling price, while feed costs are costs incurred to produce livestock body weight gain [9]. The fattening of Aceh cattle fed by forages and concentrate supplementation in different levels needs to be evaluated. This study was aimed to determine the IOFC of Aceh cattle fattened with forage and concentrate supplementation in a different levels.

2. Materials and method

The research was conducted from May to August 2018, using twenty (20) males Aceh cattle in Livestock Breeding Center for Excellent and Forage Animal Feed (BPTU-HPT) Indrapuri, Aceh Besar Regency. Aceh cattle, aged 1.5 to 2.5 years with approximately similar body weights were kept intensively in individual housing. The cattle were divided randomly into four treatments according to different forage and concentrate levels, i.e. T1 (100:0) as a control consisting of 25 kg forage without any additional commercial concentrate, T2 (70:30) using 20 kg forage and 1 kg commercial concentrate, T3 (50:50) consisting of 15 kg forage and 2 kg of commercial concentrate, and T4 (30:70) consisting of 10 kg forage and 3 kg of feed commercial concentrate. Nutrient content and price of each feed used in the study is presented in Table 1.

| Variable/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  | 11.5        |
| Organic matter without N (%) | 44.97 | 58.78 |
| Price (Rp./kg)     | 500    | 3,500       |

*Proximate analysis results, done in Laboratory of Animal Nutrition, Faculty of Animal Science UGM.

Aceh cattle kept for three months and weighed every month for measuring the average daily gain (ADG). Feed intake (FI) were observed daily by weighing the offered feed minus the leftover feed. Feed conversion (FCR) was calculated by dividing gain from the total dry matter intake (DMI). Feed efficiency (FER) was calculated dividing total DMI from the gain and multiplying by 100%. Feed cost per gain (FCG) was calculated by dividing the gain from the feed cost (FI x Price). Income from feed costs (IOFC) was calculated by multiplying the price of live cattle (at the time of study, Rp.45,000/kg) with gain minus the feed cost. Data were analyzed using a one-way of ANOVA and continued by Duncan’s New Multiple Range Test (DMRT).
3. Results and discussion

Table 1 shows that concentrate feed increased (P <0.05) the DMI and ADG. The results are in line with [10] that an increase in high DM consumption will produce a high ADG. In this study, 50% concentrate supplementation (T3) were able to increase DMI and ADG as well as resulted by 70% of supplementation (T4). According to [11] that increasing the level of concentrate exceed the livestock requirement will not increase ADG.

**Table 2.** Total and daily DMI, average daily gain, feed conversion, feed efficiency, feed cost per gain, and income over feed cost of Aceh cattle fattened for forage and concentrate on a different level.

| Variables                        | T1       | T2       | T3       | T4       |
|----------------------------------|----------|----------|----------|----------|
| Total DMI (kg)                   | 342.52±36.85 | 422.74±27.10 | 479.93±23.68 | 452.66±20.03 |
| Daily DMI (kg/d)                 | 3.76±0.41  | 4.65±0.30  | 5.27±0.26  | 4.97±0.22  |
| ADG (kg/d)                       | 0.17±0.06  | 0.46±0.10  | 0.72±0.17  | 0.67±0.08  |
| Feed conversion ratio            | 20.35±4.19 | 10.52±2.16 | 7.67±1.36  | 7.54±0.60  |
| Feed efficiency (%)              | 4.52±1.47  | 9.81±1.90  | 13.42±2.73 | 13.33±1.10 |
| Feed cost (Rp.)                  | 655,408±70,52 | 965,036±51,85 | 1,230,567±45,31 | 1,334,507±38,33 |
| Feed cost per gain (Rp./kg)      | 38,930.12b | 24,036.02a | 19,692.87a | 22,262.54a |
| IOFC (Rp.)                       | 1,383.53a  | 10,998.34b | 18,659.93c | 15,411.18bc |

\[a, b, c\] Different superscripts denote significant differences between rows (P<0.05).

Based on Table 2, the feeding of concentrates significantly decreased (P <0.05) the FCR and increased (P <0.05) the FER. However, the FCR of Aceh cattle fed by different level of concentrate supplementation did not differ (T2, T3, T4), but the FER of Aceh cattle in T2 was the lowest (P <0.05) compared to T3 and T4. The FER value was following the ADG, as stated by [12] that livestock with high ADG will be more efficient in using the feed. The smaller FCR, the greater FER would be obtained, which means that the feed used to produce meat will be more efficient and more profitable, as stated by [12] that the smaller the feed conversion will be profitable because less feed is consumed to achieve optimal products at a particular time. This was in accordance with [13], who reported that male Bali cattle with concentrate supplementation has higher ADG (0.70 vs. 0.30 kg/day) and FCR (11.50 vs. 15.58) than fed by single forages.

In this study, the concentrates supplementation (T2, T3, T4) were able to decrease the FCG, as much as Rp.15,000. The main factor affecting the high FCG is feed efficiency and price. [5] stated that the use of high-quality feeds in fattening practices can increase ADG, carcass percentage, and reduce FCG. However, price of high-quality feeds must be competitive to minimize the FCG. However, in this study the different levels of concentrate supplementation did not significantly reduce the FCG.

By feeding concentrate supplementation, farmers were benefited from the increase of IOFC, 7 times than feeding single forage. The highest IOFC was reached in feeding 50% concentrate supplementation (T3), implies that the farmers do not need to increase the level of concentrate supplementation to result an efficient feed cost. To optimizing beef cattle production, a high DMI must be reached and would increase the FER and ADG. In a result, FCG would be smaller and high IOFC would be achieved. It is in accordance with the statement of [8] that high ADG correlates with feed efficiency for livestock growth. The ADG has a direct effect on IOFC that produced in the fattening practices. The study of IOFC was reported by [9] that obtained the IOFC for Simmental-Ongole Crossbred fattened by concentrate feed is Rp.18,391.

4. Conclusion

The conclude our finding, farmers of Aceh cattle are benefited from feeding concentrate as a supplement in fattening practice. The best level of concentrate supplementation on forage feed is 50:50.
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