Ettawah Crossed Bred production on *Hibiscus rosa-sinensis* leaves supplementation in daily ration

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Abstract. This research had run during dry seasons in the farm of farmer in Tulungagung District, East Java Province of Indonesia for 3 months. This study was carried out for measurements for average daily gain (ADG), dry matter (DM), organic matter (OM) and Crude Protein (CP) consumptions and digestibility, also feed conversion ratio (FCR) on the effect of *Hibiscus rosa-sinensis* (*H r-s*) leaves supplementation in daily ration for Ettawah Crossed Bred Goats (ECBG). The experiment method was used in this study and 12 (twelve) heads of ECBG in average of weight 17.33 ± 0.33 kg and 8 months age as the object of research. The ECBGs were divided into 3 groups of treatment supplementation level in main ration. Individual cages were used in this research. The Level of *H r-s* leaves as supplement were 0% (P0); 2% (P1) and 4% (P2) based on total DM ration. Data of nutrient consumption were collected dail, data of nutrient digestibility were collected during 1 week in the and of research used in vivo technique. The results, Level of supplementation of *H r-s* leaves giving significantly different (P≤0.05) on ADG. The highest ADG in P2 which was the highest level of supplementation of *H r-s* leaves. That was strongly indicate that leaf of *H r-s* in the daily ration especially in 4% level giving impact to metabolism especially in absorption and support to animals for growing fast. From the resulr of FCR, ration for ECBG have to evaluation for ration formulate using Hibiscus rosa-sinensis leaves as supplement or substitute in ration especially for having ADG better and decrease FCR value.

1. Introduction
This research was based on the daily customs of farmers feeding to their animals (Ettawah Crossed Bred Goats, ECBG) as the main animal in their own integrated farming. Farmers feeding their animal with *Hibiscus rosa-sinensis* (*H r-s*) leaves as supplement in the daily ration for meet the quantitative requirement of animal need, especially during the dry season [2]. *H r-s* trees wellknown in many districs like Tulungagung and Blitar, and *H r-s* trees were planted for fencing the yards also planting along the street entire villages. The Potency of *H r-s* was wellknown as medicine due to potential suitable material for various intervention on metabolism therapeutic. *H r-s* having many secondary metabolites including saponin, fatty acids, vitamin, tannin and oxalate [5,6,7,8]. On the other hands, tannin, saponin and oxalate sometimes giving negatif effect during microbial activity for fermenting feedstuff and degradation nutrient in goats rumen. Aware of the documented of therapeutics potential from these secondary matebolites. Ths current study undertook an experimental approach, firstly for effect of *H r-
leaves as supplement in ration on ADG, intake and digestibility of nutrient, FCR and ADG of ECBG in varies level.

2. Material and method

2.1 Material of research

Feeding Treatment were divided into 2 feedstuffs namely Main Ration and Supplement feedstuff: The feedstuff for main Ration from by-products of agroindustry processing like Tofu waste, grape hulls, coconuts hull, coffee peals, and peanut peals. Its were formulated based on the crude protein and total digestible nutrition requirement. Supplement feedstuff: using the leaf of H rosa-sinensis in the level 0 %, 2 % and 4 % from total Dry Matter (DM) ration.

Twelve heads of Ettawah Crossed Bred in 8 months age and in average weighed 18 ± 0.2 kg were used in this research. The animals bought from the same Farm in Tulungagung and all animals free from worm and scabies diseases. Composition of main ration based on total DM showed in table 1.

| Feedstuff Composition | P1 (%) | P2 (%) | P3 (%) |
|-----------------------|--------|--------|--------|
| Pollards              | 15.71  | 15.71  | 15.71  |
| Cococnut hulls        | 17.82  | 17.82  | 17.82  |
| Coffee Peals          | 17.83  | 17.83  | 17.83  |
| Peanuts Peals         | 14.28  | 14.28  | 14.28  |
| Tofu Waste            | 17.60  | 17.60  | 17.60  |
| Grape Waste           | 16.76  | 16.76  | 16.76  |
| Total                 | 100.00 | 100.00 | 100.00 |

| H r-s supplementation | 0     | 0.02  | 0.4   |
| DM (%)                | 88.00 | 4.60  | 68.00 |
| CP (%)                | 88.32 | 15.83 | 72.00 |
| TDN (%)               | 95.22 | 10.70 | 50.86 |
| Pollards              | 11.01 | 11.04 | 48.80 |
| Coffee Peals          | 13.5  | 21.00 | 72.80 |
| Peanuts Peals         | 23.7  | 23.70 | 69.89 |
| Tofu Waste            | 16.48 | 14.35 | 59.00 |
| Grape Waste           | 14.00 | 14.52 | 68.29 |

2.2 Method of research

Experimental research was used in the current study. There were 4 stages of research and the first stage was adaptation for feeding treatment, and it was run for 2 week. Secondly, preliminary research was run just 1 week. This stage was needed for personal adjusting of feed and water requirement. The third stage was collecting data for nutrient consumption, and nutrient digestibility. The stage was run for 60 days. Animals were kept in individual cages with the feeding and watering on daily controlled and the waste of feed were weighed daily. Samples of ration and waste were collecting from each animal were analysed in proximate method. Data from laboratory analyses were used for calculating Dry Matter (DM), Organic Matter (OM) and Crude Protein (CP) intake. Nutrition digestibility measurement was running for 7 days in the end of each month in keeping in in-vivo method. Each animal was measured.
and collected for urine volume and faeces. All samples were analysed in AOAC method as refer to [1]. Performance of ECBG producton were dry matter (DM), organic matter (OM) and crude protein (CP) intake and digestibility, average daily gain (ADG) and feed conversion ratio (FCR). Daily feeding of DM was 3.5% from body weight. ADG was measured from final and initial body weight divided total days of keeping. For feeding control each animal was weighed weekly for meet quantitative and nutrition requirement. FCR was measurement from ADG divided averages of DM daily intake. Daily temperature and humidity were controlled for reach comfortable condition for animals.

Formula for nutrient consumption as showed

\[
DMI = (\text{Total feeding} \times \%DM \text{ of ration}) - (\text{Total leftover of feeding} \times \%DM \text{ of lefttocer})
\]

\[
OMI = (\text{Total feeding} \times \%OM \text{ of ration}) - (\text{Total leftover of feeding} \times \%OM \text{ of lefttocer})
\]

\[
CPI = (\text{Total feeding} \times \%CP \text{ of ration}) - (\text{Total leftover of feeding} \times \%CP \text{ of lefttocer})
\]

Formula for digestibility as showed

\[
DMD = \frac{(DMI - \%DM \text{ excreta} \times \text{total gram excreta})}{DMI} \times 100\%
\]

\[
OMD = \frac{(OMI - \%OM \text{ excreta} \times \text{total gram excreta})}{OMI} \times 100\%
\]

\[
CPD = \frac{[(CPI - \%CP \text{ excreta} \times \text{total gram excreta} + \%N \text{ urine} \times \text{volume urine})]}{CPI} \times 100\%
\]

Formula for ADG as showed

\[
ADG = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{Total days keeping}}
\]

Formula for FCR as showed

\[
FCR = \frac{DMI}{ADG}
\]

Datas of nutrient intake and digestibility, ADG and FCR were analysed in one way of variance analyses and will be continued in Duncant’s new multiple range test.

3. Results and discussion

The averages DM, OM and CP intake from every level of H r-s supppllement were showed in table 2. Averages DM, OM and CP digestibility from every level of H r-s supppllement were showed in table 3. Averages ADG and FCR from every level of H r-s supppllement were showed in table 4.

| Intake | P1        | P2        | P3        |
|--------|-----------|-----------|-----------|
| DM (g/h/d) | 1406.81 ± 9.37 | 1370.42 ± 18.78 | 1322.49 ± 9.97 |
| OM (g/h/d) | 1151.78 ± 23.45 | 1041.54 ± 13.95 | 1026.44 ± 11.58 |
| CP (g/h/d) | 167.80 ± 3.53 | 173.70 ± 1.26 | 170.37 ± 0.57 |

Average of nutrients digestibility were showed in table 3.
Table 3. Averages of DM, OM, CP digestibility (%)

| Digestibility | Level of $H_r$-s supplement |
|---------------|-----------------------------|
|               | P1  | P2  | P3  |
| DMD           | 64.61 ± 0.43     | 69.63 ± 0.44 | 66.41 ± 0.48 |
| OMD           | 80.29 ± 0.11     | 85.58 ± 0.39 | 83.75 ± 0.31 |
| CPD           | 69.30 ± 0.13     | 73.70 ± 0.11 | 70.37 ± 0.15 |

Average of ADG and FCR were showed in table 4

Table 4. Averages of ADG and FCR

| Parameter | Level of $H_r$-s supplement |
|-----------|-----------------------------|
|           | P1  | P2  | P3  |
| ADG (g/h/d)| 112.15 ± 0.94<sup>a</sup> | 101.24 ± 0.26<sup>b</sup> | 126.55 ± 0.46<sup>a</sup> |
| FCR       | 12.54 ± 0.20     | 13.53 ± 0.13 | 10.83 ± 0.18 |

Level of $H_r$-s leaves supplement giving non significantly different on DM, OM and CP intake, DM, OM and CP digestibility and FCR value. Level of $H_r$-s leaves supplement giving significantly different ($P \leq 0.05$) on ADG. The highest ADG was P3 and the lowest ADG was P2.

Based on temperature and humidity in farm during research were 27 – 30°C and 78 - 86%, and those were on standart for animal comfortable zone especially in farm environment. The comfort milieu giving effect for normal activity like consume of feed and water, so it were impact to amount of feed which was each animal taking. The non significantly different for DM, OM and CP intake between level supplement of $H_r$-s, it was indicate that animal have same condition for eating feed. From data, DM intake in P1, P2 and P3 increase similarly with increase of level of $H_r$-s leaves. It was tent that $H_r$-s leaves in feed could decrease consumption.

The amount of DM intake in P1 was highest than other level supplement. On the other side value of OM digestibility in P2 was the highest. Those value were not similar. And based on level of $H_r$-s leaves in feed, P2 have more $H_r$-s than P1. It was tend that $H_r$-s in P2 increasing absorption of OM. $H_r$-s have active compound which were wellknown as antimicrobial in rumen especially for decrease protozoa population. In the other hand, level of tannin and saponin in the moderate concentration just kill protozoa and it would make population of microbes in rumen increase. Total of microbes in rumen indicates activity of fermentation for lingkages degradation of organics compound like poly sacharides, poly fatty acid and protein into simple compounds as glucose, fatty acid or amino acid. When fermentation activity running, many material of feedstuff physically became smaller and went to ingest form. This condition make rumen pressure from feedstuff lower, and it was impact to animal rumen sensory for hungry and animal wants to take a feed again. One of several factors in nutrient intake or consumption value was amount of feeding, animal ability for consume the ration and animal ability for selection feedstuff in ration. The later ability often make the qunatitative of nutrient better and it was impact to value of dry matter, organic matter and also crude protein intake or consumption.

The value of intake as the result of [3] Sum of DM, OM and CP intake were not giving similarity to digestibility value. Refer to [9], $H_r$-s leaves have vitamin and amino acid higher than leaves of other plants. Vitamin and amino acid content in $H_r$-s were support to activity of intestine cell wall and also increasing enzymes activity for nutrient absorption. When activity of absorption higher, it makes to value of nutrient such as organics and especially protein will be better. That situation releven with this study. Treatment animals with $H_r$-s supplementation have nutrient digestibility more than no supplementation treatment. The value DMD, OMD and CPD often describes the performance of animals in growing rates. Depend on (5), $H_{rosa-sinensis}$ having secondary metabolites which could decrease cholesterol, lipidemia and white blood cell synthesys so energy from feeding giving more effective for muscles and meat synthesis, and in the current research, animal with supplementation of $H_r$-s in level 4% have better than animals in level supplementation 2% in ADG. Implication from DM intake and ADG was to FCR. The best FCR was P3.
4. Conclusions
The level of H rosa-sinensis leaves in level 4% giving significantly different in ADG. That was indicate that level of supplementation of H rosa-sinensis leaves impact to activity of rumen microbes positively for ferment nutrients. Active compound from H rosa-sinensis tend impact to increasing absorption of nutrient.

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