The effect of local resources feed on different physiological status of Bali cattle

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Abstract: This study aims to determine the effect of local resource feed on Bali cattle's different physiological statuses. This study has been carried out in the Lili Experimental Garden and the NTT AIAT from July to October 2019 (for four months). This study used a completely randomized design (CRD) with three feed treatments at different physiological statuses (female parent 5-7 years old, male 2-3 years old, and children 6-12 months old). Each treatment consisted of 3 replications, each with a physiological status of 9 cattles, totaling 27 cattles. Feed ingredients and feed formulations are analyzed in the laboratory using proximate analysis to determine their nutritional content. The parameters observed were the nutritional value of feed, feed intake, changes in body weight at different physiological statuses. The results showed that the feed treatment had a very significant effect (F count> 0.05 and 0.01) on bulls' body weight changes. It significantly affected feed consumption (bulls, female broodstock, and calves) and changes in body weight in physiological status different (female parent and child). The feed treatment that gave the best average yield was B feed. cattle (0.28 kg/head/day).

1. Introduction
Most beef production comes from people's farms, which generally have not implemented an efficient business concept. Some potentials and opportunities have not been used optimally. The survey results by [1] show that in the smallholder livestock business, basal feed is dominated by forages that vary widely in type and quantity; In the rainy season, natural grass production is abundant, while in the dry season, it experiences a shortage. Production of natural grass in a year ranges from 3 tonnes DM/ha in Naukae to 6 tonnes DM/ha in Raknamo [2]. The low quality of dry grass also causes the growth and activity of rumen microbes to decrease so that the supply of nutrients to pregnant landlords is reduced [3]. Microbial activity and growth are very important in providing nutrients for ruminants, especially pregnant mothers [4].

The feed has an important role in the development of ruminant livestock both for basic living, growth, and the production of meat, milk, and children or as a source of energy, so feed is an important factor in the livestock business, which is largely determined by the feed given. Besides having a big influence on livestock development, feed is also the largest production cost in the livestock business, reaching ± 70% of all production costs.

Energy is the dominant factor affecting livestock productivity; however, not all digested energy can utilize by the body. Suppose the feed energy supply does not meet the need for normal body functions such as mechanical work activities, muscle work, and metabolic processes in the body. In that case, this deficiency will obtain from the catabolism of energy reserves in the body, such as glycogen, fat, and protein [5]. Energy needs are the most basic needs, and if the energy needs are met, the needs for protein, vitamins, and minerals will usually be fulfilled as well [6]. Furthermore, [7] stated that if the energy supplied is insufficient, other feed substances will be converted into energy so
that the feed's usability is low. The energy needs of ME (MJ) and protein gram/day for basic living for adult cattle is 49 MJ; 408 g/day, to increase body weight 0.5 kg, 0.75 kg, respectively requires energy and protein 60 MJ; 489 g/day, and 66MJ; 552 g/day [8].

Therefore, it can understand that the obstacle that is often encountered is the low productivity of livestock because the feed does not meet the needs. Many cows look thin or die in the dry season due to lack of feed or disease [9], so it is necessary to find alternative feed sources. The utilization of agricultural waste as feed ingredients for ruminants is important because more than 90% of domestic feed producers, especially cattle, are smallholder farms [10].

Increasing livestock productivity can be done by providing additional feed in the form of concentrate. One of the natural resources used as animal feed ingredients is agricultural waste and industrial agricultural waste. According to [11], supplementation technology can provide additional reinforcing foods or concentrates for protein and energy sources to stimulate the synthesis of rumen microorganisms to increase fermentation and digestibility, impacting livestock growth. Based on the description above, it is necessary to research cattle feed formulation based on local resources at different physiological statuses.

2. Materials and methods

The research was conducted at the Naibonat Experimental Garden (KP) and Lili Experimental Garden (KP) for four months, from July to October 2019. Starting with collecting local feed ingredients and treatment of feed on livestock. The raw materials for the feed from local resources are Putak, rice bran, corn stover (straw, cobs), dry corn, Gamal leaves, green bean straw, dry cassava/cassava, and rice straw as basic feed. Feed ingredients and feed formulations are analyzed in the laboratory using proximate analysis to determine their nutritional content. This study used a completely randomized design (CRD) with three feed treatments at different physiological statuses (female parent 5-7 years old, male 2-3 years old, and children 6-12 months old). Each treatment consisted of 3 replications for each physiological status; there were nine cattle, and a total of 27 cattle were used. The assessment procedure was to make feed formulations using three feed formulas using local feed raw materials, the same Crude Protein (CP) content (12%). Basal feed: rice straw ad libitum; concentrate 2% of body weight. A 10-week feed trial with a 2-week preliminary period. Using a permanent individual cage with a size of 1 x 2 meters, complete with a place to eat and drink using a bucket with a capacity of 10 liters. The data collected were the amount of feeding, the amount of leftovers, changes in body weight. Proximate feed samples analysis (feed ingredients, concentrate feed, and leftovers).

2.1. Observed parameters

The parameters observed in the assessment are:
1. Nutritional Value of feed ingredients and concentrates
2. Feed consumption
3. Changes in animal body weight at the different physiological status

The data collected was tabulated then analyzed using RAL followed by the LSD test [12].

2.2. Feed Treatment

The treatments given in the study consisted of 3 treatments with three replications, with the same quality (CP), with the composition of the feed ingredients formulation in the following Table 1.

2.3. Feed requirements

To determine the need for feed, the livestock must first be weighed to determine its initial body weight. An animal's feed requirement can determine by providing a minimum of 10% of body weight [13]. Every day, the feed is given by first weighing it with the Golden dragon branded sitting scale. With a capacity of 15 kg as needed. The leftover feed weighed the next day while feeding to determine how much feed was consumed by one animal each day during the study.

2.4. Provision of drinking water

Drinking water is given ad libitum by preparing a place for drinking water that has been provided together next to the area to eat.
2.5. Feeding
In the morning, the cattle are given feed according to the treatment by first weighing the feed; the next day remaining feed is considered to find out the amount consumed then continued with the feed at the same time during the study (table 1). Feed Consumption According to [14], the formula for calculating feed consumption is: Feed consumption = amount of feed given (kg) – The amount of leftover feed (kg).

Table 1. Composition of feed formulation for 3 treatments.

| Type of Feed          | Treatment A | Treatment B | Treatment C |
|-----------------------|-------------|-------------|-------------|
| Putak                 | 12          | 10          | 6           |
| Bran                  | 10          | 12          | 14          |
| Corn straw            | 7           | 3           | 6           |
| Corn cob              | 3           | 7           | 9           |
| Corn                  | 10          | 9           | 6           |
| Gamal Flour           | 36          | 37          | 40          |
| Mung bean straw       | 16          | 15          | 10          |
| Cassava flour         | 3           | 3           | 3           |
| Pea pod               | 3           | 4           | 6           |
| **Total % ingredients** | **100**    | **100**     | **100**     |
| **Total CP**          | 12          | 12          | 12          |
| **Total TDN**         | 52.9        | 53.7        | 53.2        |
| **Total CF**          | 19.2        | 19.6        | 20.0        |
| **Total CF**          | 5.3         | 5.1         | 5.2         |

2.6. Acceleration of Growth
To determine the acceleration of livestock growth, weighing is carried out every two weeks using the Ruudweigh 200 digital scale with a capacity of 2000 kg. After the cattle are weighed, the average body weight is calculated, and then the feed requirements are calculated according to the development of body weight every two weeks. ADG (Average Daily Gain) According to [15], how to measure cow productivity by calculating ADG with the formula: ADG = initial body weight (kg) - final body weight (kg): length of maintenance (days).

2.7. Feed Sampling
For feed analysis in the laboratory, samples of feed ingredients and complete feed were taken from the study type. The feed sample was weighed before being put in the oven to find out its fresh weight, then put in the oven at a temperature of 60°C. After drying, the sample was weighed to determine the dry weight then milled for analysis in the laboratory to determine the levels of substances contained in the feed.

3. Results and discussion

3.1. Nutritional value of feed ingredients and treated feed
To determine the nutritional value of feed ingredients and the three types of treatment feed can be seen in table 2. It can see that the nutritional value of the highest treated feed ingredients is Gamal leaves (22.2: 21.58%), and the lowest is cassava/dry cassava (1.76: 4.93). The treatment/concentrate feed given to livestock, the highest nutritional value was treatment A feed (16.07%; 20.34%; 3952 kcal/kg), followed by treatment B feed (15.46%; 18.79% ; 3935 kcal / kg) and the lowest was in the C treatment feed (15.13; 23.82; 3963 kcal/kg). The basic feed is rice straw with nutritional value (5, 71; 28., 14; 3108 Kcal/kg). The results of this study are following the opinion of [16], which states that providing concentrate with a crude protein (CP) content of 15-16% is very suitable for fattening cattle in tropical areas because in this area during the dry season, forage productivity decreases so that concentrate feed is needed. To meet the protein needs of the feed. This follows the statement of [17], which states that the critical point of forage for tropical areas is at least 7% crude protein (CP). Crude
protein content (CP) below 7% causes microbial activity in the rumen to decrease so that digestion speed will decrease, so it needs to be combined with forage from legumes because fattening cattle feed is recommended to contain CP 12% [18].

Table 2. Nutritional value of feed ingredients and treatment feed.

| Feed Ingredients   | Crude Protein (%) | Crude Fiber (%) | Energi (kcal/kg) | NDF   |
|--------------------|-------------------|-----------------|------------------|-------|
| Milled Corn        | 9.16              | 3.31            | 4088             | 15.60 |
| Rice Bran          | 7.38              | 30.8            | 3815             | 53.17 |
| Putak              | 2.23              | 6.90            | 3554             | 20.52 |
| Cassava            | 1.76              | 4.93            | 3566             | 12.61 |
| Corn straw         | 4.92              | 33.18           | 3364             | 64.47 |
| Mung bean straw    | 8.71              | 27.01           | 3558             | 41.38 |
| Pea pod skin       | 4.43              | 33.72           | 3612             | 51.68 |
| Corn cob           | 3.86              | 35.48           | 3795             | 62.88 |
| Gamal flour        | 22.2              | 21.58           | 40.32            | 41.70 |
| Rice straw         | 5.71              | 28.14           | 3108             | 65.26 |
| Feed A             | 16.07             | 20.34           | 3.952            | 39.36 |
| Feed B             | 15.46             | 18.79           | 3935             | 36.94 |
| Feed C             | 15.13             | 23.82           | 3962             | 43.12 |

Results of analysis of the feed laboratory of the Ciawi Balitnak. 2019.

3.2. Feed Consumption

The results of variance showed that the treatment of local resource feed had a very significant effect on the dry matter consumption of female broodstock and calves. It also had a significant effect on the dry matter consumption of Feed-in bulls.

The average feed dry matter consumption at each physiological status of Bali cattle can be seen in the following Table 3.

Table 3. Average consumption of dry feed (kg).

| Physiology status | Treatment | Average consumption of BK feed |
|-------------------|-----------|-------------------------------|
| Heifer            | Feed A    | 4.08 a                        |
|                   | Feed B    | 5.12 b                        |
|                   | Feed C    | 3.80 a                        |
|                   | Feed A    | 1.42 a                        |
| Calves            | Feed B    | 2.13 c                        |
|                   | Feed C    | 1.69 b                        |
|                   | Feed A    | 2.66 a                        |
|                   | Feed B    | 3.88 b                        |
|                   | Feed C    | 3.02 a                        |

Note: the numbers followed by the same letter are not significantly different from the 5% LSD test.

Table 3 shows that there are differences between feed treatments on all observed feed dry matter consumption parameters. In the physiological status of female cows, the treatment that gave the highest average dry matter consumption was treatment B, namely 5.12 kg head/day, and was significantly different in the A and C feed treatments. The treatment that gave the highest average dry matter consumption was in treatment B and was significantly different from treatment A and C feed. The average dry matter consumption in treatment B for calves and bulls was 2.13 kg and 3.88 kg.

Feed consumption is related to the digestibility of the nutrients it contains. At the same time, digestibility is influenced by the amount and content of nutrients consumed by the animal. The amount of digestibility determines the number of nutrients to meet basic living needs and growth. Maximum feed consumption is highly dependent on nutrient balance indigestion [19, 20]. This is
because nutritional needs are the main stimulus to the hypothalamus as the center of hunger. Furthermore, [19] stated that the imbalance of feed nutrients would affect feed consumption.

Nutrient balance in the ratio is mainly related to rumen fermentation, carbohydrates, and other factors that will affect rumen fermentation, affecting feed consumption [21]. Increased consumption based on dry matter tends to increase the consumption of different food substances. Feed consumption is strongly influenced by energy requirements for livestock and rumen capacity. Livestock will continue to consume feed until their energy needs are met, even if the rumen capacity is not yet full. Conversely, if the rumen capacity is full, the livestock will stop eating even though their energy needs have not been met [22]. The level of livestock consumption is strongly influenced by palatability and macro and micronutrient balance in the ratio. Rations with high palatability and balanced nutritional levels will increase livestock ration consumption. It optimizes bioprocessing in the rumen by increasing rumen microbes in degrading feed [23].

3.3. Changes in body weight of cows at the different physiological status

The results of variance showed that the treatment of local resource feed (concentrate) had a very significant effect on the daily weight gain of calves and significantly impacted the daily weight gain of cows and bulls. The average daily body weight gain for each cattle physiological status can see in the following table 4.

Table 4. Average initial body weight, final body weight, and daily weight gain in each physiological status of Bali Cattle.

| Physiology status | Treatment | Average of early weight gain (kg/tail/day) | Average of final weight gain (kg/tail/day) | Average daily gain (kg/tail/day) |
|-------------------|-----------|------------------------------------------|------------------------------------------|---------------------------------|
| Heifer            | Feed A    | 156.33                                   | 181.50                                   | 0.36 a                          |
|                   | Feed B    | 157.33                                   | 200.67                                   | 0.61 b                          |
|                   | Feed C    | 155.33                                   | 186.00                                   | 0.43 a                          |
| Calves            | Feed A    | 40.93                                    | 56.17                                    | 0.22 a                          |
|                   | Feed B    | 51.3                                     | 71.5                                     | 0.29 b                          |
|                   | Feed C    | 49.7                                     | 67.27                                    | 0.25 a                          |
| Bull              | Feed A    | 162.8                                    | 181                                      | 0.26 a                          |
|                   | Feed B    | 163.5                                    | 193.7                                    | 0.43 b                          |
|                   | Feed C    | 162.3                                    | 183.17                                   | 0.30 ab                         |

Note: the numbers followed by the same letter are not significantly different from the 5% LSD test.

Table 4 shows that there are differences between local resource feeds on the observed daily body weight gain. In cattle's physiological status, the treatment that gave the highest average daily body weight gain was in the B feed treatment, namely 0.61 kg/head/day, and the physiological status of calves, namely 0.29 kg/head/day and was significantly different in treatment. A and C. Likewise, the treatment bulls' physiological status, which gave the highest average body weight, was found in treatment B, namely 0.43 kg/head/day, and was significantly different in treatment A but was not significantly different from treatment C. This happened because treatment B feed has balanced nutritional content for basic life and production. The results of this study are different from those of [24] and [25] revealed that cattle give CP concentrate 13.10%; TDN 72.5% and CP 19.38% TDN 60.54% ADG 0.87 kg/head/day and 0.67 kg/head/day for PO cattle. The difference is due to the different breeds of cattle and different types of concentrates. [26] reports that high protein content can increase feed digestibility which affects increasing livestock growth. The research results by [27] showed that cattle fed with 13% CP concentrate feed as much as 1% of body weight resulted in a daily weight gain of 0.56 kg/head/day.
4. Conclusions and Suggestion

4.1 Conclusions
Feed local resources from agricultural waste (6% Putak, 12% bran, 3% corn straw, 7% corn cobs, 9% corn flour, 37% gamal flour, 15% green bean straw, 3% cassava flour, pod shells 4% green beans) with ad libitum rice straw basal feed gave high results of dry matter consumption at different physiological status (parent: 5.22, male: 3.88: and child: 2.13 kg/head/day and body weight gain in Bali. cattle (0.61 kg/head/day) male (0.43 kg/head/day) and calves (0.29 kg/head/day).

4.2 Suggestions
In order to increase the consumption of dry matter feed, the increase in daily bodyweight of the parent, male, and child who consume rice straw basic feed ad libitum can give additional local resource feed which is made into concentrate as much as 2% of the BW.

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