Nutrient fulfilling status for bali cows in Bali, Indonesia in season differences

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Abstract. This study aims to determine the number of nutrients given in feed for Bali cows in different seasons. The study used a survey method through observations on 27 livestock groups in Bali by measuring the amount of feed given, diversity of feed ingredients, and sampling of feed ingredients for analysis. Measurements were made on three season (the rainy, mid-dry, and the peak of the dry-season). The results showed a decrease in the type and diversity of feed ingredients in the ration, while the amount of ration given (kg/day of fresh weight) was almost the same (33.17 kg, 33.15 kg and 32.82 kg). The total protein available in the ration was decreased in the rations given, namely: 706.52 g (rainy season), 648.65 g (mid-dry season), and 611.37 g (peak dry season). While the total energy tends to increase according to successive seasonal changes: 12,650.7 kcal ME, 13,820.18 kcal ME, and 13,974.21 kcal ME. From this study, it can be concluded that although there is a decrease in the type and diversity of feed ingredients in the rations given to Bali-cows according to the season in Bali, but the amount of protein and energy above the basic livelihood needs of livestock.

1. Introduction
Bali cattle as one of the native livestock in Indonesia has several advantages over other native cows such as adaptation to the environment, fertility rate, and percentage of the carcass. Various efforts have been made by the Provincial Government of Bali to increase population and productivity, one of which is fostering and establishing a group of cattle spread throughout the regencies/cities of Bali since 2009/2010. The formation of these livestock groups has proven effective not only in assisting government programs in increasing population and productivity, but also in the processing of cattle manure for organic fertilizers for plants in their farming systems [1].

Until now the maintenance system still applies traditional patterns, especially in feeding. This is still done by farmers in general by most people in Indonesia, so effectiveness and efficiency are low [2]. With these conditions, feeding is integrated with the natural conditions of the environment, there is no specific land for planting forage [3]. During the rainy season, there is a large amount of forage feed, both grass and legumes, but the farmers' understanding of the importance of legumes for cattle is still lacking. Local legumes are needed by cattle to increase metabolic energy intake, N intake, feed efficiency and increase productivity [4]. In the maintenance of cattle with traditional patterns, breeders prioritize the amount of feed provided for their livestock to meet their needs, regardless of the type of quality feed. Giving natural grass is preferred in rations even in the dry season given rice straw, resulting in dry matter and increased fiber fraction in the ration. Increased dry matter and fiber fraction can affect digestibility and animal performance [5] and loss of undegradable amino acid RUP [6].
Changes in the composition of forage feed ingredients in rations from the rainy season to the dry season in Bali will also result in nutrient fulfillment given to the bali cows. During the rainy season there is a large amount of feed ingredients, so the diversity of feed ingredients in the ration and the proportion between grass and legumes is quite good and the feed digestibility level is quite good [7]. With the diversity of feed ingredients in a good ration, the fulfilment of nutrients for the Bali cows in Bali, Indonesia has also been sufficient above the basic necessities of livestock [8]. Entering the dry season, especially at the height of the dry season, the availability of feed ingredients is increasingly limited, so the composition and proportion of the types of feed ingredients in the diet will result in changes in nutrient fulfilment. Therefore this research is to find out the nutrient fulfillment status for the bali cows in Bali according to the changing seasons.

2. Materials and methods

2.1. Sample determination
A total of 27 cattle groups were found in 3 regencies from 9 Districts in Bali Province. Determination of districts is based on areas that are predominantly paddy agriculture, areas that are predominantly plantation agriculture, and areas that are predominantly dry land. In each district, it is grouped into 3 altitude places, namely: lowlands, plains, and plateaus. At each altitude places, 3 groups of cattle were chosen as the sample sites, and 3 groups and their livestock were randomly selected as samples in each group. The names of cattle groups were obtained from data from the Bali Provincial Agriculture Office, and selected livestock groups were far apart between groups.

2.2. Method
This study uses a survey method through observation of cattle herds by observing and recording data on feed given to their livestock. The feed data measured included: the number of rations given in 1 day, the type of forage ingredients in the ration, the proportion (%) of each type of feed ingredients in the ration, and the collection of samples of each type of feed ingredients. Observations and records are carried out during the rainy season (February-March), mid-dry season (June-July), and the peak of the dry season (October-November).

2.3. Laboratory analysis
Samples of feed ingredients that have been collected are first composited according to the height of the place. Furthermore, proximate analysis tests were carried out in the laboratory for each type of feed material to determine the dry matter content, crude protein, and energy. Crude proteins are analysed using the “auto analysis destruction” method, while energy is analysed by the “calorimetry method”.

3. Results and discussion

3.1. Feed amount and diversity of feed ingredients
The amount of feed given for Bali cows is almost the same throughout the season in the range of 32.82 kg - 33.17 kg, but the diversity and proportion of forage types in the ration are different. Entering the dry season, the provision of legume is getting smaller, while the percentage of natural grass is increasing (Table 1). This shows that in the changing seasons from the rainy season to the dry season there is a decrease in the availability of forages, then the porosity of the feed ingredients in the ration occurs changes. However, the number of rations given for the Bali cows is still the same, because farmers prefer the amount of feed given compared to the quality. The amount of ration given does not change much from the rainy season to the dry season, because the characteristics of farmers in Bali in the group system pay great attention to their cattle, especially in the group system. All livestock groups formed by the government in Bali have received guidance both in livestock management and in the processing of manure, so that farmers' knowledge is quite good [1].
Table 1. The amount of feed given and the diversity of feed ingredients.

| Variable                                                                 | Rainy Season | Mid-Dry Season | The Peak of The Dry Season |
|--------------------------------------------------------------------------|--------------|----------------|----------------------------|
| 1. The average amount of feed given (kg/head/day)                        | 33.17        | 33.15          | 32.82                      |
| 2. The proportion of feeding diets in rations                            |              |                |                            |
| -Natural Grass (%)                                                       | 43.83        | 58.46          | 72.51                      |
| -Pennisetum purpureum (%)                                               | 24.08        | 20.18          | 8.22                       |
| -Broadleaf (%)                                                           | 12.97        | 1.06           | 1.76                       |
| -Leguminosae (%)                                                         | 8.69         | 3.17           | -                          |
| -Rice Straw (%)                                                          | 10.43        | 17.10          | 17.51                      |

When viewed from the number of rations given per day in the form of fresh weight in the rainy season, the dry season, and the peak of the dry season, it is still sufficient for cattle needs per day for 10% fresh from the body weight [9]. The average body weight of the bali cattle that have given birth in the range of 250-350 kg, the amount of forage feed given is in accordance with the needs.

The composition of forage feed ingredients in the ration is still dominated by the provision of field grass above 50% in the dry season and less elephant grass, even the percentage of rice straw is increasing. With the composition of feed such as this crude fiber content gets higher, it will affect digestion intake and performance [5]. Reduced intake of livestock can cause GI nematode infections and loss of endogenous proteins [10]. Providing high field grass in the ration can improve meal selection and reduce production performance [11].

The percentage of legumes given was very low and decreased during the dry season to only 3.17%. Local legumes are needed by cattle to increase metabolic energy intake, N intake, feed efficiency and increase productivity [4], can increase microbial fermentation in the rumen which is responsible for 5-10% carbohydrate digestion [12] and can reduce CH₄ emissions and production efficiency [13]. Changes in feeding with rice straw can cause loss of undegradable amino acid RUP [6]. Some legumes contain tannins, as anti methanogenic and increase palatability in livestock [14].

3.2. Nutrient fulfilment / day

The different types and diversity of feed ingredients in the rations given are in accordance with seasonal changes, causing higher dry matter (DM) rations (Table 2). This is due to the increasing proportion of field grass and rice straw in rations. The higher DM ration results in higher fiber fraction, where high fiber fractions affect digestibility and animal performance [5]. Never the less, the amount of dry matter consumed (DMI) in the ration is fulfilled 2-3% of the weight of the parent cow. However, the digestibility level provided for the Bali cows in Bali during the rainy season is still quite good [7] and the fulfilment of nutrients has also exceeded the basic needs of life [8].

Table 2. Nutrient fulfilment/day, on season differences.

| Variable         | Rainy season | Mid-Dry Season | The peak of the dry season |
|------------------|--------------|----------------|----------------------------|
| Dry-matter (kg)  | 6.72         | 6.94           | 7.16                       |
| Crude Protein (g)| 706.52       | 648.65         | 611.37                     |
| Energy (kcal. ME)| 13,140       | 13,820         | 13,970                     |

In the Table shows the increasing percentage of the use of natural grass and rice straw in the ration entering the dry season and the peak of the dry season, resulting in the amount of protein (CP) in the ration decreasing by 611.39 g. Therefore the quality of feed is determined by the composition of feed ingredients in the diet, especially protein [15] and affects rumen fermentation, nutrient degradation,
microbial enzyme activity, the population of rumen bacteria, and microbial protein synthesis [6]. If the amount of protein in the diet is compared to the Kearl standard of 614 g [16], Leng is 432 g/day [17], and Mariani is 593.25 g [18], then the amount of crude protein (CP) in the ration is given to Bali cows in Bali have fulfilled above basic necessities, especially at the height of the dry season.

The amount of energy available in the ration is increasing according to the changing seasons from the rainy season to the dry season. This is related to the composition of feed ingredients in the ration, especially the percentage of natural grass and rice straw that is increasing. Nevertheless the amount of energy contained in the ration that can be consumed by a parent cow in Bali in the range of 13,140 kcal/day - 13,970 kcal/day exceeds the Kearl basic living standard of 12,400 kcal/day [16], Leng [17] and Mariani [18] research results for Bali cattle as many as 9,822 kcal/day.

4. Conclusions
In the changing seasons from the rainy season to the dry season, there are a change in the composition of the forage ingredients in the bali cows ration in Bali, the percentage of natural grass and rice straw percentage increases while the legumes decline. The amount of ration given in fresh weight or dry matter (DM) meets the needs according to the weight of the cow. The amount of protein (CP) and energy in the ration provided by the bali cows in Bali during the wet and dry season is fulfilled above the basic life needs.

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