The effect of adding concentrated feed containing fermented banana corm meal fed to Bali cattle

U S Rosnah¹, M Yunus¹, G Maranatha¹, E D Sulistijo¹ and Y L Henuk²*

¹Faculty of Animal Science, University of Nusa Cendana, Kupang, East Nusa Tenggara, Indonesia.
²Department of Animal Science, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Sumatera Utara, Indonesia.

E-mail: *profesorhenuk@gmail.com

Abstract. The purpose of this study was to determine the effect of adding concentrated feed containing fermented banana corm meal included into Bali cattle rations fattening farmers' patterns on their feed consumption, digestibility of dry matter and organic matter. This study used 12 Bali cattle with the age range from 1.5 - 2 years and their body weight of 105-120kg. The research method used was a completely randomized design with four treatments and three replicates. The four treatments were: T₀ = basal feed breeder pattern + concentrate without fermented banana corm meal; T₁ = basal feed breeder pattern + concentrate with 10% fermented banana corm meal; T₂ = basal feed of breeder pattern + concentrate with fermented banana corm meal 20%; and T₃ = basal feed of breeder pattern + concentrate with 30% fermented banana corm meal. The statistics analyses showed that the treatment had no significant effect (P> 0.05) on the consumption digestibility of DM and OM from Balinese cattle fattening farmers' patterns. The conclusion was the addition of concentrated feed with fermented banana corm meal with different levels offering the same effect between treatments on feed consumption, digestibility of DM and OM from Bali cattle fattening farmers' patterns.

1. Introduction

The use of agroindustrial co-products and/or by-products in animal feed has been disseminated among cattle ranchers, appearing as a possibility of economic viability for the beef cattle production system [1]. One of the by-products from banana waste is banana scorm (Figure 1) located at the bottom of the banana plant stem which is below the surface soil [2]. Banana scorm as waste agriculture after banana harvesting can be a substitute as a source of non carbohydrates structural. Dried banana corm meal has a content of 76% starch, calories 42.5%, protein 3.4%, Ca 150%, P 2%, Fe 0.04%, vitamin 4% and water 20% [3]. Banana corm thus can be used as an energy source for ruminants. Material feed as an energy source, feed ingredients that contain roughly crude protein 20%, crude fibre is less than 18% [4]. Therefore, promoting the use of alternative feed resources, derived from crops and trees for animal nutrition which are more “environmentally friendly”, will lead to more sustainable development and will increase self-reliance in tropical countries [5]. The purpose of this study was to determine the effect of adding...
concentrated feed containing fermented banana corn meal included into Bali cattle rations fattening farmers' patterns on their feed consumption, digestibility of dry matter (DM) and organic matter (OM).

![Figure 1](image)

**Figure 1.** A banana plant, showing the location of the banana corn [after 2]

2. Materials and methods

2.1. Experimental site, animals and management

The present study was conducted in Oelatsala Village, Taebenu Sub-district, Kupang District, in Kupang, East Nusa Tenggara Province. This village has been established as “Desa Binaan Fapet Undana” for long time. Twelve bull Bali cattle aged 1.5 – 2 years old with an initial body weight of 105 – 120 kg with an average body weight of 114.64 kg and CV of 5.62%. They were spread among eight breeders in the village. Selection of breeders' respondents is deliberately proportional to the experience of raising fattening Bali cattle for at least 3 years by having 1-3 fattening Bali cattle and is willing to lend their animals used in this study. They were kept in individual pen.

The food used in this study was basal feed in the form of forages where generally given lamtoro (*Leucaena leucocephala*), turi (*Sesbania grandiflora*), spark plugs (*Melochiaum bellata*), banana stems (*Musa paradiceae*), and their concentrated feed consisting of ground corn, fermented banana corn meal, rice bran, gamal flour, salt, homogenized urea. The concentrate is given according to treatment. The fermentor used for fermentation of banana corn meal uses EM4 (*Effective microorganism*) according to instructions from [6].

The research method used was a completely randomized design with four treatments and three replicates. The four treatments were: (1) **T₀** = basal feed breeder pattern + concentrate without fermented banana corn meal; (2) **T₁** = basal feed breeder pattern + containing concentrate 10% fermented banana corn meal; (3) **T₂** = basal feed of breeder pattern + concentrate containing 20% fermented banana corn meal and (4) **T₃** = basal feed of breeder pattern + concentrate containing 30% fermented banana corn meal. Basal feed is generally given 2 times a day and drinking water is provided
*ad libitum.* The Bali cattle were fed their diets with ingredients composition of experimental diets is presented in Table 1.

### Table 1. Nutrient composition of concentrate as a supplement for fattening Bali cattle

| Ingredients                              | Treatments |
|------------------------------------------|------------|
|                                          | T₀  | T₁  | T₂  | T₃  |
| Rice bran (%)                            | 50  | 50  | 50  | 50  |
| Corn meal (%)                            | 30  | 20  | 10  | 0   |
| Fermented banana corn meal (%)           | 0   | 10  | 20  | 30  |
| Gliricidia sepium leaf meal (%)          | 15  | 15  | 15  | 15  |
| Urea (%)                                 | 3   | 3   | 3   | 3   |
| Salt (%)                                 | 2   | 2   | 2   | 2   |
| Total                                    | 100 | 100 | 100 | 100 |

Calculated analysis:

- Dry matter (%)  
  T₀: 89.17, T₁: 89.01, T₂: 88.75, T₃: 89.34
- Organic matter (%)  
  T₀: 88.69, T₁: 88.93, T₂: 87.30, T₃: 86.08
- Crude protein (%)  
  T₀: 14.33, T₁: 14.84, T₂: 14.89, T₃: 15.44
- Fat (%)  
  T₀: 3.68, T₁: 4.82, T₂: 4.93, T₃: 4.04
- Crude fibre (%)  
  T₀: 14.68, T₁: 15.60, T₂: 16.60, T₃: 18.20
- BETN (%)  
  T₀: 55.97, T₁: 53.68, T₂: 50.89, T₃: 48.39
- Energy (Kkal/g)  
  T₀: 4.06, T₁: 4.13, T₂: 4.07, T₃: 3.99

2.2. Parameter measured and data analysis

Variables assessed in this study were dry matter (DM) intake (kg/day) and organic matter (OM) intake (kg/day) of the experimental animals. The data in this research was analysed using analysis of variance [7].

### 3. Results and discussion

The treatment on the consumption and digestibility of DM and OM of fattening Bali cattle breeders is showed in Table 2.

### Table 2. Mean consumption and digestibility of dry matter (DM) and organic matter (OM) of Bali cattle fattening cattle breeder patterns

| Parameter               | Treatments |
|-------------------------|------------|
|                         | T₀±SD      | T₁±SD      | T₂±SD      | T₃±SD      | P-Value |
| DM intake (kg/e/h)      | 3.41±15    | 3.61±13    | 3.61±14    | 3.73±12    | 0.78    |
| OM intake (kg/e/h)      | 3.08±13    | 3.26±12    | 3.28±10    | 3.39±11    | 0.64    |
| DM digestibility (%)    | 57.31±18   | 56.65±19   | 60.19±16   | 56.14±20   | 0.07    |
| OM digestibility (%)    | 58.60±21   | 58.48±24   | 61.96±23   | 58.32±23   | 0.08    |

3.1. Effect of treatments on consumption of DM and OM

The result of the treatment in this research did not have a significant effect (P> 0.05) on the feed consumption and DM and OM digestibility in the fattening rations of Bali cattle breeders. It’s caused by the supplemented of concentrate feed containing fermented banana corn meal with different levels does not make a difference to the content of DM and OM concentrate feed, and when supplemented in fattening Bali cattle consumed basal rations the breeder supply pattern also does not make a difference to the consumption of ingredients dried and organic ingredients. When compared the current the results with [8] was lower feed consumption and DM and OM digestibility in fattening Bali cattle breeders.
supplemented with concentrated feed containing gamal meal and banana corn meal with an average DM digestibility in the treatment of 1 kg of concentrate feed containing 10% banana corn meal that is equal to 3.52 kg/e/h and 2 kg of concentrate feed containing 20% banana corn meal of 4.14 kg/e/h, while the consumption of OM is 3.12 kg/e/h and 3.62 kg/e/h.

While the results obtained [9] an average consumption of DM feed for fattening cattle breeders supplemented with concentrate with gamal leaf flour and banana corn meal of 3.44 - 4.0 kg/e/h, OM of 3.17 – 3.60 kg/e/h, but the results obtained in this study are higher when compared to the results obtained by [9] in the fattening system of breeder patterns without supplementation of the concentrate obtaining average feed consumption of ingredients and low OM digestibility of 2.40 kg/e/h and 2.17 kg/e/h, respectively. This is due to the low quality of feed provided by breeders when viewed from the pattern of breeder supply, because the feed provided is not to meet nutritional needs, but only to meet the needs and level of consumption of livestock.

This is in accordance with [9] that consumption of Bali fattening cattle feed on Timor island is very dependent on the supply by breeders without regard to aspects of nutritional adequacy characterized by low body weight gain so that the addition of concentrates with banana scorm meal as an energy source cannot be give effect to the increase in consumption of dry ingredients and organic rations. Based on these comparisons, Bali cattle fattening patterns need to be added to concentrate feed to increase the feed consumption and DM and OM digestibility for fattening Bali cattle feeds, but the supply of basal feed also needs to be taken into account so as to meet the nutritional needs of livestock and have an impact on improving the performance of fattening Bali cattle at the breeder level.

3.2. Effect of treatments on the digestibility of DM and OM
The results of the analysis of variance showed that the treatment had no significant effect (P> 0.05) on the digestibility of DM and OM in the fattening cattle rations. This is due to the fact that the feeding patterns of breeders are very diverse as a result of the low quantity of feed, consequently the nutritional value of the feed also varies mainly the content of crude fibre, so that the supplementation of concentrate feed with complete nutrition cannot have an effect on the digestibility of DM and OM in fattening Bali cattle breeder pattern. According to [9], the digestibility values of DM and OM which are relatively equal between treatments are caused by organic components and extra ingredients without nitrogen and the relatively coarse fibre content of the treatment feed. Factors that influence the speed of digestion of OM are influenced by the size of feed particles, the content of digestible carbohydrates, the content of cellulose, hemicellulose, lignin, and protein [8]. High digestibility of DM in ruminant animals showed that high nutrient digestibility, especially by rumen microbes [9].

4. Conclusions
The conclusion of this study was that the addition of concentrate feed with fermented banana corn meal with different levels in the rations of breeders gives the same effect between treatments on consumption, digestibility of DM and OM from fattening Bali cattle.

References
[1] Renard C 1997 Crop Residues in Sustainable Mixed Crop/Livestock Farming Systems (Wallingford: CAB International)
[2] Lu P, Woo K-C and Liu Z-T 2002 Estimation of whole-plant transpiration of bananas sing sap flow measurements Journal of Experimental Botany 53 375 p 1771-1779
[3] Solikhin N, Prasetyo A S and Buchori L 2012 Pembuatan bioetanol hasil hidrolisa bonggol pisang dengan fermentasi menggunakan Saccaromycess cereviceae [Making bioethanol from the hydrolysis of tuber banana by fermentation using Saccaromycess cereviceae] Jurnal Teknologi Kimia dan Industri 11 1 p 124-129
[4] National Research Council 2001 Nutrient Requirements of Dairy Cattle, 7th ed (Washington DC: National Academy Press)
[5] Hilakore M A, Ginting-Moenthe U and Henuk Y L 2010 The use of gewang tree \((Coryphaelatarobx)\) as feed for livestock in the Tropics \textit{Proceedings of the 5\textsuperscript{th} International Seminar on Tropical Animal Production (ISTAP)} Faculty of Animal Science, Gadjah Mada University, October 19-22, 2010, \textit{p} 785 – 789 UGM, Yogyakarta

[6] Parakkasi A 1999 \textit{Ilmu Nutrisi Ternak dan Makanan Ternak Ruminan} [\textit{Animal Nutrition and Ruminant Nutrition}] (Jakarta: Universitas Indonesia)

[7] Steel R G D and Torrie J H 1995 \textit{Principles and Procedures of Statistics} 2\textsuperscript{nd} Edition (London: McGraw-Hill International Book Company)

[8] Samba F D 2016 Effect of Feeding Concentrate Containing Banana Wen Meal on Dry Mater, Organic Mater Intakes and Total Protein Plasma of Fattening Bali Cattle Kept as Local Farmer Pattern \textit{Bachelor Thesis} Faculty of Animal Science Universitas Nusa Cendana, Kupang

[9] Astuti A A A and Subur P S B 2009 The effect of high quality feed supplement addition on the nutrient consumption and digestibility of early lactating dairy cow \textit{Jurnal Peternakan} \textbf{33} 2 \textit{p} 81-87

\textbf{Acknowledgment}

The authors express their sincerely thanks to Directorate of Research and Community Service The Directorate General of Research and Technology Strengthening and Development of the Ministry of Research, Technology and Higher Education for funding this research, farmers in Oelatsala Village, Dean and students of the Faculty of Animal Science, and Head and staffs of the LP2M Nusa Cendana University, Kupang.