THE EFFECTIVENESS OF FORAGE AND BALANCED CONCENTRATE FEEDING ON THE NUTRITIONAL VALUES AND PERFORMANCE OF BUFFALOES

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ABSTRACT

This study is aimed to evaluate the effectiveness of forage and balanced concentrate in diet on nutritional contents and nutrient digestibilities of feed, feed consumption, an average daily gain, and feed efficiency in buffaloes. This study used a completely randomized design with 4 replicates. The diet treatments were: (R1), 100% native grass, (R2), 70% native grass + 30% concentrate. (R3), 60% native grass + 40% concentrate (R4) 50% native grass + 50 % concentrate. The experimental results showed that the amount of concentrates, significantly affected ($P<0.05$) the contents of dry matter, organic matter, and crude fiber. However, the crude protein, crude fats, digestibilityies of dry matter and organic matter of the contents were not significantly affected $P<0.05$). It could be concluded that the addition of concentrated ration to buffaloes provides better productivity than field grass, with the best treatment being the R2.

Keywords: *Bubalus bubalis*, buffaloes, nutritional value, performance

INTRODUCTION

Buffalo is one of the national assets in the field of animal husbandry and also the largest ruminant meat producer after cattle in Indonesia. The buffalo populations has been on a decrease with many factors, including the management of feed and the provision of inadequate feed influencing the business development and productivity of buffaloes. Community habits in maintaining buffaloes are still being extensified, where buffaloes are released on the edge of forests and fields. Buffaloes only eat field grass around the farmers' farms without any additional feed in the form of concentrates. In addition, buffaloes are only considered as savings that will only be sold when needed. The buffaloes can produce more optimally when they are kept commercially by providing professional maintenance and feed management. Buffaloes have the potential to be developed in Indonesia due to geographical, ecological, and fertility conditions in some parts of Indonesia which are suitable for the development of buffaloes. There are some regions that prefer buffalo meat such as in Banten, Nanggroe Aceh Darussalam, North Sumatra, West Sumatra, West Nusa Tenggara, South Kalimantan, and South Sulawesi. In addition, buffalo livestock can be developed on farms in the countryside with limited facilities and infrastructure. However, there are still some limitations in the business of buffaloes. Among others, the limited demand for buffalo

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meat products, the limited supply of buffalo and the dominance of buffalo livestock trading by a small group of entrepreneurs (Romjali, 2012). Besides that, buffaloes are also slow to breed because of their low reproductive appearance (Diwyanto and Handiwirawan, 2006). Buffaloes are actually very responsive to improvements in maintenance management and feeding management, (Suhubdy, 2002; 2006a; Suhubdy *et al*., 2004; 2005). Opportunities for farmers are plenty enough to get higher profits when the buffalo livestock business is preferred and not seen as a side business which at any time can be sold, but is focused in the direction of commercial livestock farming. However, this condition does not motivate farmers to maintain more intensive buffalo livestock (Wirdahayati and Bamualim, 2006). When compared with cows, the buffaloes have extraordinary and specific abilities in terms of utilizing less quality of feed (low protein forages and high crude fiber content). This is possible because of the relatively large physiological characteristics of digestion and the stomach capacity of buffaloes. Research on feed management in other ruminants has been carried out, but feed management research for buffaloes is still very limited. Astuti (2017) reported that the utilization of palm oil fronds as a source of forage with the addition of concentrates to goat improve the body weight gain by 53.57 g/day/head.

MATERIAL AND METHODS

This research was carried out to evaluate the forage balanced concentrate on nutritive values and the performance of buffaloes maintained intensively. Forage used was field grass, *Setaria* sp. and some kind of legume that grows around the farm. Concentrates were formulated from sources of feed ingredients (tofu waste, rice bran, sago, palm oil cake) that are easy to obtain. The nutritional components were analyzed using the AOAC method (AOAC, 2012). The analysis of digestibility done using the in-vitro method with the Odorou and Brooks method (1990) with the use of the buffalo rumen content. The composition of concentrate is presented in Table 1.

Experimental design

The experimental design used was a completely randomized design with 4 treatment groups of 4 replications. The diets treatments were:

R1 = 100% native grass,
R2 = 70% native grass + 30% concentrate,
R3 = 60% native grass + 40% concentrate
R4 = 50% native grass + 50 % concentrate

The observed variables included the content of dry matter, organic matter, crude protein, crude fiber, digestibility of dry matter and organic matter of ration treatments. To test performance, the growth phase of 16 buffaloes (body weights ranging from 308 to 441.5 kg) were used and distributed into four treatments groups with 4 replicates each. They were given the diets as described above. A completely randomized block design was used in this study. All the buffaloes were given a diet at a level of 3% body weight, on a dry matter basis.

Statistical analysis

All data were subjected to an analysis of variance and significant differences were further tested by Duncan's multiple range test.

RESULT AND DISCUSSION

Nutritional contents and digestibility of diet

The nutrient contents and digestibilities of the diet treatments are presented in Table 2.

The statistical analysis showed that the combination of forage and concentrates significantly affected (P<0.05) the contents of dry matter, organic matter, crude fiber, but had no effect (P>0.05) on the crude fat, crude protein, and digestibility of dry matter and organic matter. Duncan's test results showed that dry matter content of R1 was significantly lower than R2 and R3, but not to the R4.

The high of dry matter content indicates that the ration has less water content, and thus, there were more sufficient nutrients for livestock. The results of this study showed that the research ration of the R1 treatment was significantly higher when compared to R2, R3 and R4.

The highest dry matter contents in this study were found in treatment R2 (95.55), and then R3 (95.51). This was because the composition ratio of treatment ingredients; native grass and 30% concentrate (R2) and 40% concentrate (R3), had lesser water than 100% native grass, but when the composition of native grass and concentrate is 50 : 50, the condition caused the water content to increase. The R1, 100% native grass was mixed with setaria grass, legume vines and other forages which thought to have good nutritional content. This could be seen by the higher crude protein content of the R1 ration (18.58%) compared to the concentrates treatment. The Organic matter is the largest part of the nutrients needed by livestock. The high of organic matter content in this treatment indicates that there were nutrients in the ration. Tillman (1991) states that the proximate components included in nutrients were carbohydrates, protein, fats, and low vitamins.

The crude fiber content in R1 was significantly higher than R2, R3, and R4. This was because of the higher crude fiber of forage compared to the concentrates in this study. There was no effect of rations on dry matter digestibility. This might be caused by the similar feed nutrient composition at all treatments.

Table 2 shows that the difference in the crude protein content of rations showed no effect (P<0.05). This was in accordance with the opinion of Anggorodi (1994) that the factors that influence the digestibility value of dry matter of rations were the proportion of feed ingredients in the ration, chemical composition, and level of protein. The high digestibility of dry matter in this research is higher than Rianto *et al* (2005) research about the waste of bier as a concentrate of buffalo, whose digestibility of dry matter was 51,76%, lower than Suardin *et al*. (2014) who obtained the digestibility of mulato grass mixed with several legumes, to range from 84.20 to 85.35%, and the percentage of digestibility of organic matter ranged from 55.67 to 68.00% (highest) which showed that all rations used in this study have almost the same nutritional quality. The low digestibility of dry matter and organic matter might be due to forage sources originating from native grass and wild legumes which have anti-nutrient contents, causing low digestibility coefficient of feed ingredients, and the treatments R3 and R4 indicate that they have the more soluble nutrient. Palatable and easy to digest.

The results of the statistical analysis showed a significant effect (P<0.05) with the combination concentrates and forages on body weight gain and ration efficiency, while the effect was very significant (P<0.01) on feed consumption. Further testing with Duncan's test showed that the R1 treatment using only field

Table 1. The formulation of concentrate treatments (% BK).

Feeds	%
Tofu waste	28
Sago	15
Rice bran	14
Palm oil cake	14
Concentrate	28
Minerals/premixes	1
Total	100

Table 2. The average of nutrient value of ration treatments (% dry matter).

Variables (%)	Ration treatments				SE
	R1	R2	R3	R4	
Dry matter	94.90 [b]	95.55 [a]	95.51 [a]	94.81 [b]	0.14
Organic matter	91.24 [a]	89.78 [b]	89.30 [b]	88.99 [b]	0.33
Crude fiber	27.42 [a]	25.03 [b]	22.60 [c]	21.64 [c]	0.63
Crude lipid	1.63	2.56	2.65	3.91	0.25
Crude protein	18.58	17.08	17.34	17.99	0.34
Digestibility of dry matter	46.17	46.33	47.67	53.67	6.26
Digestibility of organic matter	60.17	56.33	55.67	68.00	7.63

Note : R1 : 100% native grass + 0% concentrate, R2 : 70% native grass + 30% concentrate,
R3 : 60% native grass + 40% concentrate, R4 : 50% native grass+50% concentrate,
(a - c) Significant differences between the rows ($P<0.05$)

Table 3. Average body weight gain, consumption, and efficiency of the treatment ration.

Variables	Treatments				SE
	R1	R2	R3	R4	
Daily gain(kg/animal/day)	0.15 [b]	1.00 [a]	0.91 [a]	1.13 [a]	0.19
Consumption (kg/head/day)	7.40 [a]	6.48 [a]	5.76 [ab]	5.62 [ab]	0.29
Efficiency (%)	2.02 [b]	15.53 [a]	15.91 [a]	20.53 [a]	3.77

Note: R1 : 100% native grass + 0% concentrate, R2 : 70% native grass + 30% concentrate,
R3 : 60% Native Grass + 40% concentrate, R4 : 50% native, grass + 50% concentrate.

grass, was significantly different from the R2, R3, and R4 treatment on body weight gain and ration efficiency. The results of this study indicate that the addition of feed concentrates other than field grass will give different results even though feeding is only 30%. The highest body weight gain were found on the buffaloes that were fed 50% field grass and 50% concentrate addition. Higher amounts of concentrates will give a higher increase in bodyweight. The buffaloes used in this research have been intensively maintained for varied time periods as at the beginning of the research. The buffaloes were previously wild/free-range animals, left free in nature without livestock breeding maintenance. When maintenance patterns are transformed into extensive systems, it takes several months before these animals can adapt. However, the animals used in the researched have been in the intensive for varying lengths of time, with some being as little as 2 weeks. This condition will give rise to different responses to the diet feeding and lifestyles of the buffaloes. This can be seen in the R2 and R3 treatments; although it showed more consumption than R4, it gave a much lower body weight gain (Table 3). The results of this studies were still higher when compared with the research of Rianto *et al.* (2005) which gave concentrate and straw feed to buffalo livestock, and the consumption was 4.34% and body weight gain of 0.37 kg/day.

CONCLUSION

Based on results of research, it can be concluded that giving of ration concentrates to buffalo cattle provides better productivity than just getting field grass. Effective feeding can be achieved at the ratio of 50% field grass and 50% concentrate.

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