

Combination of Pakchong Grass and Indigofera Leguminous to Improve Body Weight of Bali Cattle

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ABSTRACT: Forage animal feed is needed by cattle, significantly increasing livestock productivity. Pakchong grass is a forage with a crude protein content of 16.45% and a lot of protein. Indigofera sp. is one leguminous and contains high protein with a crude protein content of 24.17%. This study aims to determine the optimal combination of Pakchong and Indigofera to increase body weight in Bali cattle. The research was conducted in UPTD. BPTHM Serading, Sumbawa, NTB Province. This study used 28 male Bali Cattle aged 2-3 years. Livestock were randomly divided into four feed groups, namely seven cattle-fed elephant grass 70% and lamtoro 30% (P0), 70% pakchong grass and 30% indigofera (P1), 60% pakchong grass and 40% Indigofera (P2), 50% pakchong grass and 50% Indigofera (P3). Livestock receives forage for one week during the adaptation period and data collection for three months. The results of body weight gain from high to low are P2 of 0.34 kg/head/day, P1 of 0.32 kg/head/day, P3 of 0.22 kg/head/day, and the lowest was P0 of 0.20 kg/head/day. Based on the results of this study, it was concluded that the optimal combination of pakchong and Indigofera in cattle feed was 60% pakchong grass and 40% Indigofera leguminous.

Keywords: Pakchong grass, Indigofera, forage, feed, Bali Cattle

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INTRODUCTION

Beef production in West Nusa Tenggara (NTB) Province continues to increase yearly. Based on BPS data (2022), beef production in NTB Province in 2019, 2020, and 2021, respectively, was 10,202 tons, 11,310 tons, and 13,489 tons (BPS, 2020). Bali cattle are predominantly kept by people in NTB, one of the national germplasms that must be preserved. Bali cattle have good adaptability.

The result of Pangesu's research (2019) showed that the adaptation of Bali cattle to the environment is better than Limousines, according to their lower heat tolerance coefficient (HTC) and higher sweating rate (Pangesu, 2019). In addition, Yosita et al. (2012) research showed that the carcass percentage of Bali cattle was 53.26%, which was higher than Ongole Crossbreed Cattle, 46.9%, and Australian Commercial Cross

Cattle's 51.27% (Yosita et al., 2012). One of the obstacles in raising livestock is the need for more feed during the dry season, which is the leading cause of decreased livestock conditions.

Forage Animal feed is needed by cattle, significantly increasing livestock productivity. Protein is one of the essential nutrients needed to increase livestock productivity. Protein intake can be obtained from animal feed sources such as concentrates and forages. A forage that contains high protein is Pakchong grass, with a protein content of 16.45%, compared to 11.6% in dwarf elephant grass and Taiwan grass 13% (Dinas Pertanian Kabupaten Buleleng, 2022).

Pakchong grass is a cross between *Pennisetum Purpureum* Grass (Elephant Grass) and *Pennisetum Glaucum* developed by Prof. Krailas Kiyotong in the Pak Chong area of

Thailand. This crossing produced grass with speedy growth. Another advantage possessed by Pakchong grass is its longevity. Its growth can reach the age of 9 and be harvested every 40 to 50 days.

Pakchong grass production is very high compared to other types of grass, which can produce 250-275 tons per hectare per year (Widiari, 2021). Indigofera leguminous (Indigofera sp.) is an example of a legume with a high protein content. Research by Sirait et al. (2012) showed that Indigofera sp. has a crude protein nutrient content of 24.17% (Sirait et al., 2012). Some research showed that Indigofera provides a high level of digestibility (77%), relatively odourless cages, drier manure, and reduced methane emissions, resulting in healthier and better quality meat (BIB Singosari, 2017). Indigofera is a straightforward plant to develop because of its high reproductive potential to produce pods with whole seeds. Its good regrowth properties allow for progressive branch development, producing high leaves. Giving Indigofera 40–60% to beef cattle could increase body weight and reduce feed conversion (Nurhayu & Pasambe, 2016).

The optimal combination of Pakchong grass and Indigofera leguminous to increase body weight in Bali cattle still needs to be discovered. Therefore, the authors conducted a study on the effect of a

combination of Pakchong grass and Indigofera as animal feed to determine the best ratio of these forages for body weight gain in male Bali cattle.

MATERIALS AND METHODS

This research was conducted from August to November 2022 at the UPTD. Balai Pembibitan Ternak dan Hijauan Makanan Ternak (BPT-HMT) Serading NTB Province, located on Jalan Lintas Sumbawa-Bima KM. 11 in Serading Village, Moyo Hilir District, Sumbawa Regency, NTB. This research was a quantitative study with a randomized block design. The federer formula determines the number of research samples:

$$\begin{aligned}t - 1)(n - 1) &> 15 \\(4 - 1)(n - 1) &> 15 \\(3)(n - 1) &> 15 \\n - 1 &> 5 \\n &> 6\end{aligned}$$

t = Number of treatments

n = Number of samples for each study

Based on the results of the formula, as many as 7 (>6) cattle were used in each treatment group. The total number of livestock used was 28 heads divided into four treatment groups. The distribution of treatment groups and feed given to each group in this study can be seen in Table 1.

Table 1. Research design

No.	Group	Feed	Number of Livestock	Mean age (year)	Mean Body Weight (kg)
1	P0	Elephant grass 70% + Lamtoro 30%	7	2,5	190,8
2	P1	Pakchong grass 70% + Indigofera 30%	7	2,4	180,6
3	P2	Pakchong grass 60% + Indigofera 40%	7	2,4	192,6
4	P3	Pakchong grass 50% + Indigofera 50%	7	2,4	184

All cattle were placed in individual cages provided with feed and water. Feed was given 10% body weight in each treatment

group, and cattle were given 3% bran. Cattle are cared for intensively, and feeding is done twice daily. The mixture of Pakchong and

Indigofera was given according to the ratio of each group. One group of livestock was given a mixture of elephant grass and lamtoro to see the effectiveness of using Pakchong and Indigofera compared to elephant grass and lamtoro. The material used in this study were livestock scales (digital), feed scales (hanging scales), livestock pens, plastic tubs, ropes, shovels, 28 male Bali cattle aged 2-3 years, pakchong grass, indigofera, elephant grass, lamtoro, bran, and water. Based on the results of this formula, the number of cattle used in this study was 28 heads.

This research was three months and one week, divided into one week for the adaptation period and three months for the data collection period. The adaptation period lasts for one week. At this stage, the cattle group were accustomed to the feed. Feed is given gradually by reducing the initial ratio. After the livestock can adapt to the new feed for one week, they proceed to the data collection period. The collection period was for three months. Livestock weighing was carried out in the morning before feeding using a digital livestock scale four times, namely the first weighing on the first day before the data collection period. The second weighing was done on the first day of the second month. The third and fourth scales were carried out on the first day of the third and fourth months of the data collection period.

The data taken in this study was the body weight of livestock. The method of measuring the observed variables is by weighing the body weight of the livestock using livestock scales. Cattle body weight gain is calculated by subtracting body weight after and before feeding treatment.

Research data on the body weight of each cattle in each treatment group were tabulated and analyzed using one-way ANOVA. A p value <0.05 was categorized as significantly different, and a P value > 0.05 was not significantly different.

RESULTS AND DISCUSSION

Overview of Research Locations

This research was conducted at the UPTD. Balai Pembibitan Ternak dan Hijauan Makanan Ternak (BPTHMT) Serading, Sumbawa, NTB Province. UPTD. BPTHMT Serading is a technical service unit and livestock breeding sector under the Department of Animal Husbandry and Health Province of NTB engaged in livestock raising and forage systems. This institution kept 210 cattles with 22 variations of forage fodder and a 42.25 ha land area.

Livestock Body Weight Gain

Ration protein affects the body weight of livestock. With higher protein content in the ration, more bacteria can live in the rumen, so the amount of protein that can be digested increases. Furthermore, Mathius et al. (1981) said higher protein consumption tends to increase the digestibility of crude protein rations (Thaariq, 2017). The basic nutritional needs of beef cattle can be seen in Table 2.

Body weight gain is an indicator to determine the growth rate of livestock and feed efficiency. Cattle body weight gain depends on the feed and its ability to utilize feed. Results of the mean daily body weight gain of the cattle given the feed treatment can be seen in Table 3.

Table 2. Nutritional Needs of Beef Cattle

Dry Matter	Crude Protein	Crude Fat	Crude Fiber	Ash	TDN
3% WG	12%	6%	12-17%	10%	64%

Note: WG= Weight Gain, TDN= Total Digestible Nutrient

Source: (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, 2015)

Table 3. The nutritional content of Pakchong

Fodder Forage	Dry Matter	Crude Protein	Crude Fat	Crude Fiber	Ash	TDN
Pakchong	17.16%	10.13%	3.26%	25.66%	11.99%	46,5%
Indigofera	98%	27,9%	6,15%	15,25%	6,41%	64%

Source: (Lounglawan et al., 2014; Mohamad et al., 2022; Nurhayu & Pasambe, 2016)

Table 4 shows that the group of cattle in P2 were given a mixture of 60% Pakchong grass and 40% Indigofera had the highest daily body weight gain (0.34 kg/head/day), then followed by P1 which was given 70% pakchong grass and 30% Indigofera (0.32 kg/head/day), followed by P3 which was given 50% Pakchong grass feed and 50% Indigofera (0.22 kg/head/day). The lowest

daily weight gain was in the P0 group, fed 70% elephant grass and 30% lamtoro. However, the body weight gain in all groups in this study was lower than Nurhayu and Pasambe's research. Nurhayu and Pasambe's research showed that 60% of elephant grass and 40% of Indigofera experienced a daily body weight gain of 0.46 (Nurhayu & Pasambe, 2016).

Table 4. Data on daily body weight gain for three periods

No	Group	Daily Body Weight (kg)			
		First Month	Second Month	Third Month	Mean
1	P0	0.20	0.23	0.22	0.20
		0.23	0.20	0.19	
		0.17	0.20	0.18	
		0.23	0.22	0.23	
		0.20	0.18	0.22	
		0.17	0.20	0.17	
		0.23	0.18	0.17	
		0.30	0.37	0.33	
2	P1	0.23	0.32	0.33	0.32
		0.28	0.33	0.35	
		0.30	0.33	0.35	
		0.27	0.35	0.33	
		0.30	0.33	0.37	
		0.23	0.33	0.35	
		0.33	0.37	0.37	
		0.30	0.35	0.38	
3	P2	0.30	0.37	0.33	0.34
		0.32	0.33	0.37	
		0.30	0.35	0.35	
		0.32	0.37	0.35	
		0.28	0.38	0.33	
		0.23	0.35	0.20	
		0.20	0.23	0.20	
		0.23	0.17	0.20	
4	P3	0.23	0.20	0.23	0.22
		0.22	0.23	0.18	
		0.23	0.22	0.20	
		0.21	0.25	0.25	

In contrast, in the author's study, the highest daily body weight gain was on a mixture of 60% pakchong grass and Indigofera 40%, which is 0.34 kg/head/day. Based on the protein content, elephant grass has higher protein than pakchong grass. The protein content of pakchong grass is 10.13% (Lounglawan et al., 2014), and the protein content of elephant grass is 10.53% (Sajimin & Purwantari, 2019). The high crude protein content of elephants greater than pakchong makes the body weight gain of cows given elephant grass higher than pakchong.

The crude protein in the feed could cause high daily body weight gain in groups P1 and P2. Feeding with good nutrition also has a good influence on livestock growth. Increased body weight of livestock can be caused by the crude protein content in the feed so that it can provide various nutrients needed by livestock (Nurhayu & Pasambe, 2016). The availability of protein will provide a food source for bacteria in the rumen so that the growth of rumen microbes becomes optimal (Ambisi et al., 2014). Pakchong grass is a graminea with a relatively high crude protein content of 10.13% (Lounglawan et al., 2014). In addition, Indigofera is also a legume with a high crude protein content of 27.9% (Nurhayu & Pasambe, 2016). Research has proven that Bali cattle whose ration protein was increased from 12% to 15% experienced body weight gain (Nasrullah et al., 2018). The amount of protein in the ration can affect the amount of protein consumption. The protein contained in the ration will support the growth of rumen microbes; these microbes in the rumen will help the process of protein digestion so that protein consumption also increases (Nasrullah et al., 2018). The high level of crude protein in a mixture of Pakchong grass and Indigofera can supply the cattle nutrition, so it can increase the body weight of cattle in this study.

The feed combination in P3, which consisted of 50% pakchong grass and 50%

Indigofera, could still increase the cattle body weight by 0.21 kg/head/day, although this increase was not too high compared to P1 and P2. Indospicine is an ingredient found in some Indigofera. Indospicine is an anti-nutritional substance that is considered the most dangerous for livestock. Nordfeldt et al. (1952) reported that cattle and sheep experienced an appetite and body weight decrease after being given 30-10% fresh Indigofera for 15 days (Nordfeldt et al., 1952). However, in ruminants, this substance can be degraded by microbes in the rumen, so it does not have a significant impact (Yanuartono et al., 2020). Indospicine poisoning cases in livestock in Indonesia have never been reported. This could be due to the non-specific symptoms of poisoning with this substance, so it has not been studied. In addition, the leguminous used in this study was *Indigofera zollingeriana* which contains low level of Indospicine (Suharlina, 2012), so it can still increase the cattle body weight, although not too high.

The Effectiveness of Pakchong Grass and Indigofera Combination Feed

Bali cattle at UPTD. BPTHMT Serading is usually given a mixture of elephant grass and lamtoro. The statistical test result showed that the body weight gain of cattle given 70% elephant grass and 30% lamtoro (P0) was significantly different from P1 and P2 but not significantly different from P3 (50% pakchong grass and 50% Indigofera). The average body weight gain of cattle at P1 and P2 was higher than the animals fed a mixture of 70% elephant grass and 30% lamtoro. This difference can be caused by the nutritional content of the ratio given to livestock. Sajimin and Purwantari's research showed that local elephant grass contains 10.53% crude protein (Sajimin & Purwantari, 2019), while pakchong grass contains 16% crude protein (Liman et al., 2022). The result of the Department of Veterinary Medicine

Department Airlangga University, Consultation and Training Laboratory Examination showed that lamtoro contained 23.8% crude protein (Putri et al., 2012), while Indigofera contained 27.9% crude protein (Nurhayu & Pasambe, 2016). Based on the higher content of crude protein and body weight gain, a mixture of pakchong grass (60-70%) and Indigofera (30-40%) is more effective in increasing livestock body weight gain than elephant grass and lamtoro feed, which are usually given to UPTD Bali bulls. BPTHMT Serading.

The result of this study indicated that livestock given 70% elephant grass and 30% lamtoro (P0) were not significantly different from the P3 group, namely 50% pakchong grass and 50% indigofera. This can be caused by several obstacles to Indigofera's application as animal feed even though it contains higher protein than lamtoro, namely the poisoning of the amount of Indospicine in Indigofera content and the nature of this grass which is not liked by livestock (Ginting, 2012). All Indigofera species contain Indospicine at different levels (Ginting, 2012). However, until now, research on the effect of this substance on livestock in Indonesia has not been reported due to the low Indospicine content in *Indigofera zollingeriana* (Yanuartono et al., 2020). In addition, Indigofera has also been reported to be less liked by livestock (Ginting, 2012), so it must be mixed with other grasses.

CONCLUSION

Based on the results of the study, it can be concluded that a combination of Pakchong grass and Indigofera can increase the body weight gain of cattle and a mixture of Pakchong 60% and Indigofera 40% is more optimal than a combination of grass Pakchong 50% and Indigofera 50%. Feeding a combination of Pakchong grass and Indigofera is more effective than a mixture of elephant grass and lamtoro for Bali cattle.

SUGGESTIONS

According to the result study, the author suggests that the combination of Pakchong grass and Indigofera feed is 60% Pakchong and 40% Indigofera. Pakchong grass and Indigofera are suggested to be given instead of elephant grass and lamtoro as high-quality animal feed during the dry season

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