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Physiological Response of Male Bali Cattle to supplementation of complete pellet feed based on Fermented Corn Cob Waste as a source of fiber and NuPro Yeast Extract Supplement

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ABSTRACT: This study aims to determine the aim of this research, namely to determine the physiological response of male Bali cattle supplemented with complete pelleted feed based on fermented corn cob waste as a source of fiber and Nupro yeast extract supplement. In this study, 4 male Bali cattle were used in the age range of 1 - 1.5 years, with an initial body weight ranging from 101-124 kg with an average of 116.75 kg and a coefficient of variation of 9.16%. This research used an experimental method with a Latin square design consisting of 4 treatments and 4 periods as replications. The treatments in this study were P_0: Pellet complete feed (20% fermented corn cob + 80% concentrate + 1% extra Nupro yeast), P_1: Pellet complete feed (30% corncob + 70% concentrate + 1% extra Nupro yeast), P_2: Pellet complete feed (40% corncob + 60% concentrate + 1% extra Nupro yeast), P_3: Pellet complete feed (50% corncob + 50% concentrate + 1% extra Nupro yeast). Data obtained in *Analysis Of Variance*. The results of this study obtained the average value of body temperature (^{0}C) P_0 38.15 ± 0.55, P_1 37.94 ± 0.81, P_2 38.42 ± 0.39, P_3 38.14 ± 0.88, pulse (times/minute) P_0 72.08±9.28, P_1 71.83±4.21, P_2 67.25±13.10, P_3 69.33±8.21, Respiratory frequency (times/minute) P_0 21,75±1.49, P_1 22.08±1.03, P_2 24±1.24, P_3 22.83±1.68 and water consumption (Liter/head/day) P_0 5.68±0.62. P_1 5.93 ± 0.82, P_2 5.75 ± 0.61, P_3 5.75 ± 0.20. The results of statistical analysis showed that the treatment had no significant effect (P>0.05) on body temperature, respiratory frequency, pulse rate and water consumption of male Bali cattle. The conclusion of the research is that complete feed supplementation with pellets containing fermented corn cobs as a fiber source provides and Nupro extra yeast supplement the same physiological response between treatments, so it can be used as a complete feed constituent at a level of 20-50% combined with concentrate feed.

KEYWORDS: complete pellets, corncob**,** extra Nupro yeast, male Bali cattle, physiological status.

INTRODUCTION

The productivity of Bali cattle in East Nusa Tenggara (ENT) and the island of Timor in particular still has a traditional extensive pattern, the maintenance of male Bali cattle is carried out using a paronization system, namely maintenance by tying them to a tree or crossbar with cut and carry feeding, while for female Bali cattle This is done using a moving tie system and some are grazed. Apart from the rearing model, cattle productivity is also influenced by the availability of feed, [1], found that in the rainy season breeders rely on the availability of feed from natural pastures, forests and riverbanks, while in the dry season they rely on other local forages. with low nutritional quality that grows around the yard or yard of the house, former food plantations and mammary trees, so that this causes feeding to no longer be based on livestock needs but based on the farmer's ability to find forage which has an impact on low livestock productivity, especially Bali cattle. male.

Nutritional needs for livestock, especially protein and energy, indirectly influence the production process and achievement of slaughter weight. Low feed quality can have an impact on improving the performance of the digestive system, causing stress in livestock and disrupting the thermogulatory process [2]. It was further stated that thermogulence in livestock plays an important role in regulating frequency, breathing, heart rate and body temperature in livestock so that they remain in a normal condition. [3] stated that the factors that cause stress in livestock are meteorological and non-meteorological factors such as the quality of feed provided and the availability of drinking water. Changes in physiological status have a negative impact on livestock, such as an increase in body temperature, abnormal heart rate and respiratory frequency[4]. This condition will have an impact on reducing body weight if it lasts for a long time and reduces immune function and can causes death[5].

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Therefore, efforts that need to be made are to improve feed quality, especially during the dry season because according to [6] nutrition is the main component that needs to be managed to increase beef cattle productivity. Providing complete feed is one solution in providing and ensuring the availability of nutrition according to livestock needs based on growth level, however non-conventional ingredients are required so that it can reduce ration costs.

One of the non-conventional materials that is available in abundance and has never been used as feed by breeders in ENT is corn cobs. The low use of corn cobs is due to its low physical and chemical properties, far from the criteria for being used as feed, so it needs to be physically processed with flour and chemically by fermentation, while outside ENT, corn cobs have been used as a constituent of concentrates and complete feed, one of which, [7] found that the use of corn cobs in complete feed replaced the elephant grass component by 34.95%, providing weight gain and feed conversion for Ongole crossbreed cattle is 0.74 ± 0.1 kg/day and 9.58 respectively compared to complete feed containing elephant grass which is 0.73 and 11.79 kg/day respectively, supplementation of undergraded protein (UDP) in complete feed (CF) can increase BK and PK consumption, increase body weight gain with a faster body weight gain rate compared to the group fed elephant grass and concentrate. [8] added that processing corn cobs using 3% urea increases the value of crude protein content and in vitro digestibility, while fermentation using the mold *A. niger or T. viridae* can increase fiber digestibility.

In optimizing the potential of complete feed, it is necessary to add extra yeast to meet the amino acid content and requirements in the complete feed ration so that it can increase the palatability of the feed and have an impact on livestock productivity. Based on the description above, the aim of this research is to determine the physiological response of male Bali cattle given complete pelleted feed based on fermented corn cob waste as a source of fiber and Nupro yeast extract supplement.

RESEARCH MATERIALS AND METHODS

This research was carried out from September-November 2023, which took place in 4 periods, each period consisting of 2 weeks of data collection and 1 week of adjustment. The livestock used in this research were 4 male Bali cattle aged 1-1.5 years with an initial body weight range of 101-124 kg with an average of 116.75 kg, while the feed ingredients used in this research were *Leuchaena leucocephala* legumes and Pellet complete feed contains corncob and local feed-based concentrate. The percentage and composition of ingredients that make up concentrate and proximate analysis of experimental feed ingredients can be seen in Tables 1 and 2. Meanwhile, the equipment used consists of a Morist scale brand with a capacity of 50 kg with a sensitivity of 100 gram for weighing forage, a Kitchen scale brand with a capacity of 5 kg with a sensitivity of 1 gram for weighing concentrate, leftover feed and feces, a silo as a fermentation container, as well as tools to measure the parameters studied, namely a stethoscope and body thermometer.

Table 1. Percentage of ingredients in concentrate

Ingredients	Presentage
Ground Corn	15
Rice Bran	30
Moringa Leaves Meal	15
Soybean Meal	17
Fish Meal	5
Coconut Meal	10
Salt	4
Urea	2,5
Probion	0.5
Premix	1
Toxin Binder	0,5
Total	100

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Table 2. Results of Proximate Analysis of Experimental Feed Ingredients

Treatment code	%Dry Matter	Organic Matter (%DM)	Crude Protein (%DM)	Crude Fat (%DM)	Crude Fiber (%DM)	Carbohydrate (%DM)	Non Nitrogen Free Extrats (%BK)	Energy	
								MJ/kg DM	Kkal/kg DM
Corncob	81,22	54,13	3,98	0,38	31,31	49,77	18,46	9,70	2.310,59
Fermented corncob	80,19	77,36	10,34	1,05	24,55	65,97	41,42	14,28	3.399,32
Complit pellet. P_0	88,45	84,81	23,97	5,97	18,82	54,87	36,05	17,34	4.128,30
Complit pellet. P_1	88,60	84,85	22,83	5,44	20,26	56,58	36,32	17,18	4.089,89
Complit pellet. P_2	88,13	82,37	20,36	4,32	22,34	57,69	35,35	16,39	3.902,10
Complit pellet. P_3	88,30	82,94	19,08	4,17	22,69	59,69	37,00	16,37	3.898,43

Note: results laboratory analysis Faculty of Animal Husbandry Maritime Affairs and Fisheries Nusa Cendana University.

Research methods

The research method that will be used is an experimental method, using a Latin Square Design (LSD) with 4 treatments and 4 periods. The treatments in this research are:

P_0: Pellet complete feed (20% corncob fermented + 80% concentrate + 1% extra nupro yeast)
P_1: Pellet complete feed (30% corncob fermented + 70% concentrate + 1% extra nupro yeast)
P_2: Pellet complete feed (40% corncob fermented + 60% concentrate + 1% extra nupro yeast)
P_3: Pellet complete feed (50% corncob fermented + 50% concentrate + 1% extra nupro yeast)

Procedure for measuring the parameters studied:

The parameters examined in this research are

1. Body Temperature (^{0}C)

Body temperature is measured using a thermometer that is inserted into the cattle body when the cattle are calm for ± 1 minute by calculating the time using a stopwatch.

2. Pulse rate (times/minute)

Heart rate measurements are carried out using a statescope near the left axilla bone (left side of the chest), carried out for one minute using a stopwatch.

3. Respiratory Frequency

Respiratory frequency was obtained by counting the up and down movements of the abdominal surface for 1 minute with a stopwatch.

4. Drinking Water Consumption

Drinking water consumption (Liters/day) is obtained from the amount of drinking water provided each day minus the water not consumed (Liters/day) divided by the length of the research period (days).

Data analysis

The data obtained in this study was tabulated and analyzed according to *Analysis of Variance* to see whether there was an effect of treatment on the observed variables [9].

RESULTS AND DISCUSSION

Animal Physiological Condition

The benchmark used as a guideline for ensuring that the body's organs are in good condition and functioning normally is knowing the physiological condition. Deviation from the benchmark is an indication that one of several organs in the animal's body in question is experiencing problems and the benchmark is in the form of physiological data [10]. Physiological data that is usually measured is rectal temperature, respiratory frequency, respiratory activity which is important for increasing heat output at high

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temperatures. Furthermore, a high respiratory frequency rate in many cases does not always indicate the success of livestock in maintaining a normal body temperature. The following are the average environmental temperatures in the surrounding locations, body temperature, respiratory frequency, heart rate and water consumption of male Bali cattle are presented in Table 3.

Table 3. Average body temperature, respiratory frequency, heart rate and water consumption of male Bali cattle.

Parameter	Treatments				
	P_0±SD	P_1±SD	P_2±SD	P_3±SD	P-Value
Body temperature (^{0}C)	38,15±0,5	37,94±0,8	38,42±0,3	38,14±0,8	0.24^{ns}
Heart Rate (times/minute)	72,08±9,2	71,83±4,2	67,25±13,1	69,33±8,2	0,.9^{ns}
Respiratory frequency (times/minute)	21,75±1,4	22,08±1,0	24,00±1,2	22,83±1,6	0.38^{ns}
Water consumption (Liter/head/day)	5,68±0,6	5,93±0,8	5,75±0,6	5,75±0,2	0.52^{ns}

Note: ^{ns} not significant effect (P>0.05)

Effect of Treatment on Body Temperature.

Based on the results obtained in Table 3, it shows that the average body temperature in livestock that received P_0 treatment was 38.15 ± 0.5 ^{o}C, P_1 was 37.94 ± 0.8 ^{o}C and P_2 was 38.42 ± 0.3 ^{o}C, P_3 was 38.14 ± 0.8 ^{o}C with a general average of 38.16 ^{o}C. The results obtained in this research are still within the normal range of body temperature according to the opinion of [2] that normal body temperature in cattle is 37-39 ^{o}C. Furthermore, the body temperature of male Bali fattening cattle supplemented with concentrate feed containing *gliricidia sepium* leaf flour obtained a body temperature range of 37-38 ^{o}C. Meanwhile, in research by [11], the body temperature of fattening Bali cattle that consumed local feed and was dominated by protein source feed obtained a body temperature of 36.55 ^{o}C. The difference in body temperature results in this study and the research above is the difference in the type of feed consumed by experimental livestock, using feed that is dominated by protein source feed, while in this study using energy source feed so the heat generated is much higher.

The results of the analysis of variance showed that complete feed supplementation with pellets containing fermented corncob and Nupro extra yeast supplement had no significant effect (P>0.05) on the body temperature of male Bali cattle. This is thought to be due to the uniformity of the energy content of pelleted feed which is not much different, as a result the energy consumption produced is not much different so that heat production in the body as a result of feed metabolic activity that occurs in the digestive tract is not much different even though Nupro extra yeast supplements are added. in rations. According to [12] the heat produced depends on the level of feed consumption. [13] added that feed consumption causes metabolic activity in the body due to the nature and quality of the feed given, the amount of feed consumed, causing an increase in body temperature, especially feed energy.

Effect of Treatment on Pulse Rate (times/minute)

Based on the results obtained in Table 3, it shows that the average pulse rate in livestock treated with P_0 was 72.08 ± 9.2 times/minute, P_1 was 71.83 ± 4.2 times/minute and P_2 was 67.25 ± 13 .1 times/minute, then P_3 was 69.33±8.2 times/minute with a general average of 70.12 times/minute. The results obtained in this study are still within the normal range of heart rate in cattle according to the opinion of [2] that the normal heart rate in cattle is 60-100 times/minute. However, the pulse value in this study is lower when compared to research by [11] who reported that the pulse rate in fattening male Bali cattle that consumed local feed was 93.51 times/minute, whereas it was higher when compared to the results obtained. [2] in fattening male Bali cattle supplemented with concentrate feed containing *gliricidia sepium* leaf flour at 66-69 times/minute. Then the results obtained in this study were much higher compared to the results obtained by [14] by providing forage and concentrate at different times, namely P_1, 87.06 ± 2.17, P_2, 90.69 ± 2.18, P_3, 88.13±2.17. This difference is thought to be caused by differences in environmental temperature, where livestock will increase their heart rate to pump O2 throughout the body's tissues through blood circulation so that the thermogulence process can normalize as a result of heat stress caused by environmental temperature.

The results of analysis of variance (ANOVA) showed that treatment had no significant effect (P>0.05) on heart rate. This is thought to be caused by body temperature and respiratory frequency, which also had no effect in this study, so the resulting heart rate was not much different. According to [15], heat resulting from metabolism influences fluctuations in all physiological conditions of the body. Metabolic body heat is circulated by the circulatory system to all parts of the body including the heart, respiration and body

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organs. [16] added that increasing body temperature causes livestock to carry out a thermoregulation process by increasing their pulse rate, high eating activity will cause metabolic activity in the body to increase so that the pulse rate increases to reduce heat in the body. This is contrary to the opinion of [17] that high heat production tends to increase heart rate which is a mechanism for maintaining stable blood pressure due to dilatation of blood vessels. Then [13] stated that consumption of different feed will cause different metabolic activities in the body, the large amount of feed consumed will cause an increase in the pulse rate every minute.

Effect of Treatment on Respiratory Frequency

Based on the results obtained in Table 3, it shows that the average respiratory frequency in livestock treated with P_0 was 21.75 ± 1.4 times/minute, P_1 was 22.08 ± 1.0 times/minute and P_2 was 24.00 ± 1. .2 times/minute, then P_3 was 22.83±1.6 times/minute with a general average of 22.66 times/minute. The results obtained in this study are still within the normal range of heart rate in cattle according to the opinion of [2] that the normal heart rate in cattle is 15-28 times/minute. The results obtained in this study are not much different from the results obtained by [14] by providing forage and concentrate at different times, namely P_1, 22.66 ± 2.27, P_2, 26.81 ± 2.21, P_3, 25.00±0.94. Then [2] in fattening male Bali cattle were supplemented with concentrate feed containing *gliricidia sepium* leaf flour at 22-25 times/minute.

The results of analysis of variance (ANOVA) showed that treatment had no significant effect (P>0.05) on respiratory frequency. This is thought to be due to the fact that body temperature has no effect, so the process of sensible heat expenditure is not much different from the process of evaporative heat expenditure so that the rate of respiratory frequency to bind oxygen (O^2) is not much different. According to [15], the final result of the biological activity of higher organisms is CO_2, energy (ATP) and heat. The greater the biological oxidation that takes place in the animal's body, the more CO_2, energy and heat the body produces, this increase has implications for respiratory frequency.

This is also because the feed metabolism process in the digestive tract is slower, resulting in greater metabolic heat due to high feed consumption and high crude fiber rations. This causes the need for oxygen in the body to increase, thereby increasing respiratory frequency. According to [17] that when the metabolic rate of feed increases, the need for oxygen and the formation of carbon dioxide will also increase, thereby affecting respiratory frequency. Then [14], shallower breathing will reduce the volume of air entering (inspiration) and air leaving (expiration) in the respiratory tract. According to [18], factors that can influence respiratory frequency include body size, age, muscle movement, environmental temperature.

Effect of Treatment on Water Consumption

Based on the results obtained in Table 3, it shows that the average water consumption in livestock that received P_0 treatment was 5.68 ± 0.6 liters/head/day, P_1 was 5.93 ± 0.8 liters/head/day and P_2 was 5 .75 ± 0.6 liters/head/day, then P_3 is 5.75 ± 0.2 liters/head/day with a general average of 5.77 liters/head/day. The results obtained in this study were much lower compared to the results obtained by [19] by providing complete feed containing banana stem silage to fattening male Bali cattle, obtaining an average water consumption in treatment P_0 of 7.2 liters/head/day, P_1 of 6.26 liters/head/day and P_2 is 7.33 liters/head/day. This difference is thought to be caused by differences in the dry matter content of the rations between these two studies, thereby providing differences in water consumption as a result of differences in dry matter consumption of the rations.

The results of analysis of variance (ANOVA) showed that the treatment had no significant effect (P>0.05) on water consumption. This is thought to be because the livestock are both given concentrate feed in the form of dry ingredients, which means that the water consumption produced is not much different. This is also thought to be influenced by external environmental factors, the environmental temperature around the cage. According to [20] states that livestock obtain water from three sources, namely drinking water, water contained in food, metabolic water which is the result of the metabolic process of glucose, fat and protein in the body. Growing animals will have their growth disrupted if they receive little water. [21] added that the body must receive enough water to balance the amount lost, in addition to the amount needed for the formation of new tissues or cells, stated that water has several functions, namely as a means of transporting nutrients, regulating body temperature, components of body tissue, cushioning the nervous system, lubricating supplies, playing a role in various chemical reactions in the body.

CONCLUSION

Based on the results and discussion above, it can be concluded that complete feed supplementation with pellets containing fermented corncob and Nupro extra yeast supplement as a fiber source provides the same physiological response between treatments, so it can be used as a complete feed constituent at a level of 10-40% combined with concentrate feed.

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