



Effect on growing of Bali cattle with difference ages raised in cages

H. Hafid

Department of Animal Husbandry, Faculty of Animal Husbandry, Halu Oleo University Bumi Tridarma Campus Anduonohu Kendari, Southeast Sulawesi 93232

Correspondent author: harapin.hafid@uho.ac.id

Abstract. This study aimed to obtain information on the influence of age differences on the growth of Bali cattle that are traditionally reared in cages. The number of cattle used was nine heads. During the study, individual cages were used. This study had a randomized block design with three ranges of body weight as a group. The treatment in this study was the difference in the age of cattle, which consisted of cattle aged one year (I1), age two years (I2), and three years (I3). The results showed that the difference in the age of the cattle had no significant effect ($P > 0.05$) on the dry matter consumption of feed, daily body weight gain, and the conversion of Bali cattle feed traditionally reared in pens. However, there is a tendency that cattle aged one year have better growth and efficiency in using feed than cattle aged 2 and 3 years. It can be concluded that raising cattle at one year of age results in more efficient growth than cattle at 2 and 3 years. However, further testing needs to be done with more cattle and a more comprehensive range of body weight.

Keywords: age, bali cattle, body weight, cages, growth

Received [18 December 2020] | Revised [17 February 2021] | Accepted [12 March 2021]

1. Introduction

As one of the centers for livestock development in Eastern Indonesia, Southeast Sulawesi has natural resources that are potential enough for ruminants, such as beef cattle, because it has a large enough land area. Even so, beef cattle, especially Bali cattle, have not been better bred (intensively). In general, farmers raise cattle to use their energy to process agricultural land, take their manure as manure, and for breeding [1], [2], and [3]. It is still sporadic for farmers to position cattle as food-producing livestock (meat), which needs to be properly maintained through a touch of technology to produce more and good quality meat and, in turn, will get revenue from the sale of cattle and more meat. maximum [4]; [5].

Several studies with intensive rearing patterns show that Bali cattle raised using feedlot method can provide very high daily growth. For example, [6] obtained an average daily body weight gain of Bali cattle of 0.6 - 0.9 kg per head per day under feedlot maintenance conditions with a quality feed. While research results by [7] showed that the body weight gain of Ongole breeds that were given reinforcement feed had an average daily body weight gain of 0.780 kg. Even the daily body weight gain of Ongole crossbred cattle in this study was relatively better than the research results by [8] of 0.73-0.82 kg/head/day.

This research was conducted to evaluate the growth of Bali cattle that are traditionally reared in cages, emphasizing age differences.

2. Materials and Methods

2.1. Materials

This research lasted for three months at Alebo Village Cattle Farm, Konda District, South Konawe Regency. The material of this study used 9 (nine) male Bali cattle which were grouped into three bodyweight ranges, I = 100 - 125 kg, II = 126 - 150 kg, and III = 151 - 175 kg. The cattle used in this study belonged to the community. The cages used are individual cages, each equipped with a place to eat and drink. The equipment used is a digital scale either to weigh cattle or cattle feed. The feed is given consists of forage derived from field grass. Meanwhile, the tools and materials used in testing the dry content of the feed are ovens, porcelain plates, and analytical scales.

Bali cattle are kept traditionally in cages with regular feeding and drinking water. In calculating feed consumption, before feeding, the feed is weighed first, and the next day the remaining feed is considered. The amount of fresh forage given was 20 kg/head/day. Weighing the cow's body weight is carried out every two weeks to determine body weight gain.

2.2 Research Methods

The dry matter analysis of the feed was carried out by laboratory testing. It took 5 grams of feed samples into a porcelain dish and then dried it in an oven at 105 °C for 5 hours. [9] stated the Dry Material Analysis equation as the following:

$$\text{WC\%} = 100\% - \text{DM}$$
$$\text{DM\%} = \frac{\text{DM total}}{\text{BS}} \times 100\%$$

Note:

- DM = Dry Matter
- WC = Water content
- DM Total = Weight After Drying
- BS = Initial Sample Weight

The research design used was a randomized block design with a range of body weights as the basis for grouping, according to the instructions [10]. The intrinsic treatment applied is the age of the cattle which is determined based on the condition of permanent tooth replacement (incisors), namely: I1 = around one-year-old, I2 = around two years old, and I3 = about three years old. The number of groups or repetitions of each treatment was three times so that nine experimental units were obtained. The statistical model of the experimental design used is as follows :

$$Y_{ij} = \mu + K_i + A_j + \epsilon_{ijk}$$

$$i = 1,2,3; j = 1,2,3$$

Note:

Y_{ij} = Observation Results

μ = General average of observations

K_i = The influence of Group i

A_j = The Effect of Age of the Crime Cow

ϵ_{ijk} = Test error

The observed variables are as follows:

1. Consumption of dry feed ingredients, calculated based on the difference between the feed given each day and the rest of the next day. Consume materials; this is then multiplied by the dry matter content of the feed.
2. Daily body weight gain, calculated based on the final body weight minus the initial body weight divided by the time interval.
3. Feed conversion, calculated based on the ratio between the amount of dry matter consumption of feed with weight gain.

3. Result and Discussion

Bali cattle growth can be described as the amount of feed consumption in dry matter and body weight gain. Feed conversion reflects the efficiency of livestock in utilizing the consumed feed to gain body weight as the final product of the livestock-raising process.

3.1. Feed consumption

The average dry matter consumption of Bali cattle feed based on different ages during the study is presented in "Table 1" below:

Table 1. The Average Consumption of Bali Cattle Feed Dry Matter Based on Different Ages During the Study (kg / head / day)

Group (Based on Body Weight range)	Age of Cattle Based on Change of Teeth (Incisors)		
	I1	I2	I3
I. (100 - 125 kg)	3.18	3.53	3.62
II. (126 - 150 kg)	3.25	3.11	3.13
III. (151 - 175 kg)	3.56	4.33	4.62
Average	3.33	3.66	3.79

Note: different superscripts in the same column show not significant differences ($P > 0.05$)

The statistical analysis results showed that the difference in the age of the cattle had no significant effect ($P > 0.05$) on the dry matter consumption of Bali cattle feed during the study. The results showed that the dry matter consumption of feed was relatively uniform even at different ages. However, there was a tendency that the increasing the age of the cattle (or getting older), the average consumption tends to grow too, although at an unreal level.

This was probably because the cattle used in the study have a different range of body weight according to the age of the cattle. Physiologically, cattle with heavier body weight require relatively more feed than cattle with low body weight. [11] : [12] show a strong correlation between cattle body weight and feed intake (consumption). According to [13], the important factors that determine the amount of feed intake are the age of the cattle, the range of body weight, sex, and conditions of maintenance whether the cow is pregnant or breastfeeding, the cow is growing or sexually mature.

According to physiological weight (body weight) plays a more critical role in determining growth performance than chronological age (length of life) [14];[15]. Cattle kept with a body weight range of no more than 10% will not show ration consumption real difference.

The consumption of dry matter for Bali cattle obtained in this study (3.33 - 3.79 kg/head/day) is the same as [16] and [17], who get dry matter consumption of cattle fed with field grass regularly. ad libitum, reinforcing feed 1.8% from BW + field grass ad libitum and reinforcing feed 1.8% from BW + field grass ad libitum + ammoniated rice straw respectively 3.45, 3.90 and 4.32 kg / head / day.

Under normal conditions, the consumption of dry matter for feed should be around 2.5% of body weight, so that a cow with a body weight of 200 kg will consume 5 kg of dry matter per day [12]; [13]; [15].

3.2. Increase in Body Weight

The average body weight gain of Bali cattle based on different ages during the study is presented in “Table 2” below:

Table 2. The Average Weight Gain of Bali Cattle Based on different ages during the study (kg/head / day)

Group (Based on Body Weight range)	Age of Cattle Based on Change of Teeth (Incisors)		
	I1	I2	I3
I. (100 - 125 kg)	0.19	0.11	0.13
II. (126 - 150 kg)	0.19	0.18	0.09
III. (151 - 175 kg)	0.30	0.17	0.14
Average	0.23	0.15	0.12

Note: different superscripts in the same column show not significant differences ($P > 0.05$)

The results of statistical analysis showed that the difference in the age of the cattle had no significant effect ($P > 0.05$) on the daily weight gain of Bali cattle during the study. This shows that the average body weight gain of Bali cattle was relatively uniform, between 0.12 and 0.23 kg per head per day. Besides, the average increase in cattle from the results of this study was relatively low as a further result of the low consumption of dry feed ingredients. Besides that, the traditional maintenance conditions with the majority of providing feed in the form of field grass are thought to trigger the low body weight gain of cattle. Because field grass has a very high fiber content, especially wood content (lignin) compared to cellulose and hemicellulose.

According to [18] and [19], the amount of feed consumption will greatly determine livestock growth. If the amount of food consumed is high, the development will be fast and reach a high body weight.

The growth pattern of this study is in line with the results of research by [20], which measured the weight gain of Bali cattle in three age groups during the rainy season, namely: 0.46 kg/head/day for calves, 0.51 kg/head/day for young cattle. 1 - 2 years old and 0.43 kg/head/day for adult cattle over three years old.

According to [21], the postnatal growth rate (after birth) follows the sigmoid growth pattern (as shown in Figure 1), where growth is at first a little slow, then very fast, and then gradually begins to decrease or slow down. The period of speedy growth in cattle is in the range of the age of the cattle, about one year at the same time as sexual maturity [22].

3.3. Feed Conversion

Feed conversion is the amount of feed consumed to form one kilogram of body weight. The average feed conversion of Bali cattle based on different ages during the study is presented in “Table 3” below:

Table 3. Average Bali Cattle Feed Conversion Based on different ages during the study

Group (Based on Body Weight range)	Age of Cattle Based on Change of Teeth (Incisors)		
	I1	I2	I3
I. (100 - 125 kg)	16.11	33.69	29.60
II. (126 - 150 kg)	20.00	16.86	35.08
III. (151 - 175 kg)	11.94	25.14	33.53
Average	16.02	25.69	32.21

Note: different superscripts in the same column show not significant differences ($P > 0.05$)

The statistical analysis results showed that the difference in the age of cattle had no significant effect ($P > 0.05$) on feed conversion during the study. However, the average feed conversion tends to increase with the increasing age of the cattle. This means that young cattle (1 year) are more efficient in using feed than older cattle (2 and 3 years). The feed conversion obtained in this study is in line with the feed conversion in [16] who gave Bali cattle three kinds of rations, namely: field grass ad libitum, reinforcing feed 1.8% from BW + field grass by ad libitum, and reinforcing feed 1.8% from BW + field grass ad libitum + ammoniated rice straw with the results of feed conversion 27.00, 12.89 and 10.21 respectively.

The high conversion of feed for cattle in this study was the impact of low feed consumption and the resulting weight gain of cattle. The high feed conversion is thought to be due to the low consumption of dry feed ingredients. It is suspected that the forage crude fiber content during the study was relatively high because when the research was carried out, Konawe Regency was hit by drought (dry season). It was thought to affect the quality of forage, especially the high and coarse and low protein and BETN. According to [9] [18] and [13], high levels of crude fiber will reduce palatability and feed consumption, which will impact the inefficiency of cattle in consuming feed ingredients.

4. Conclusion

The difference in the age of the cattle did not significantly ($P > 0.05$) affect the dry matter consumption of feed, daily body weight gain, and feed conversion of Bali cattle that are traditionally reared in pens. However, there is a tendency that cattle aged one year have better growth and efficiency in using feed than cattle aged two and three years.

REFERENCES

- [1] Ananta, A., H. Hafid and L.O.A. Sani. Factors that affect the productivity of Bali cattle business for transmigrant and non-transmigrant breeders in Kabaena Island, Bombana Regency. *Journal of Tropical Animal Science and Technology*. 2 (3): 52-67. 2015.

- [2] Hasiruddin, H. Hafid, La Malesi. The potential and financial feasibility of beef cattle farming in Alebo Village, Konda District, South Konawe Regency. *Journal of Tropical Animal Science and Technology*. 2 (3): 88-105. 2015
- [3] Sani, LOA, U. Rianse, H. Hafid, Bahari, and W. Kurniawan. Household economy of Bali cattle farmer with different farming combination in Konawe Selatan Regency of Southeast Sulawesi Province. *Proceeding International Seminar*. IPB International Convention Center Bogor, 28-30 August 2018. P: 28-30. 2018
- [4] Hafid, H. Beef Cattle Development Strategy in Southeast Sulawesi to Support the Achievement of National Meat Self-Sufficiency: Scientific Oration inauguration of a Professor. Halu Oleo University, Kendari. 2008
- [5] Hafid. HRE Gurnadi. R. Priyanto and A. Saefuddin. Identification of carcass characteristic for estimating the composition of beef carcass. *J. Indonesian Trop. Anim. Agric.* 35 (1): 22-26. 2010
- [6] Oatim, JS. Compensatory growth of male Bali cattle on some energy-protein balance rations and their effect on carcass characteristics. *Master's Thesis of Science*. IPB Postgraduate Program, Bogor. 2000
- [7] Lestari CMS. Adiwiranti R. Arifin M. Purnomoadi A. The performance of Java and Ongole crossbred bull under intensive feeding management. *J. Indonesian Trop. Anim. Agric.* 36: 109-113. 2011
- [8] Nusi M. Utomo R. Soeparno. The effect of using corn cobs in complete feed and undegraded protein supplementation on body weight gain and meat quality in Ongole crossbred cattle. *Animal Bulletin* 35: 1-9. 2011
- [9] Anggorodi. *General Forage Science*. Gramedia. Jakarta. 1997.
- [10] Mattjik, AH and Sumertajaya. IM. *Experiment Design with SAS and Minitab Applications*. IPB Press. Bogor. 2013
- [11] Hafid, H. Performance of commercial Australian cattle cross castration maintained on a feedlot basis. *Master's Thesis of Science*. Bogor Agricultural Institute. Bogor. 1998
- [12] Hafid H. The effect of compensation growth on the growth efficiency of the Brahman Cross castrated cattle in the feedlot fattening. *Agroland Journal*. 9 (2): 179-185. 2002
- [13] NRC. *Nutrient Requirements of Beef Cattle: Eighth Revised Edition*. National Academies of Sciences, Engineering, and Medicine. Washington, DC: The National Academies Press. <https://doi.org/10.17226/19014>. 2016
- [14] Hafid, H. Study of Growth and Distribution of Meat and Productivity Estimation of Carcass of Fattened Beef. *Doctoral Dissertation*, IPB Postgraduate School. Bogor. 2005
- [15] Hafid H, Hasnudi, Bain A, Nasiu F, Inderawati, Patriani P and Ananda SH Effect of fasting time before slaughtering on body weight loss and carcass percentage of Bali cattle *IOP Conf Series: Earth and Environmental Science* 260.012051. 2019

- [16] Amril, A., S. Rasjid and S. Hasan. Field grass and urea ammoniated rice straw as a source of forage in fattening male bali cattle with reinforcing foods. Proceedings of the Bali Cattle National Seminar. Faculty of Animal Husbandry, Udayana University Bali, Denpasar. 1990
- [17] Hasan, S., A. Ako and Sudirman. Fattening by feedlot and pasture feedlot at body weight gain of bali cattle. Proceedings of the Bali Cattle National Seminar. Faculty of Animal Science Udayana, Denpasar. 1990
- [18] Tillman, AD., H Hartadi, S. Reksohadiprojo, S. Prawirokusumo and S. Lebdoesoekojo. Basic Forage Science. Second printing. Gadjah Mada University Press. 1984
- [19] Hafid, H., Rahman, Nuraini, Y. Wati, Inderawati, SH Ananda and L. Ba'a. Production of broiler chicken carcass fed on rice bran biomass on different marketed ages. IOP Conf. Series: Earth and Environmental Science209. 012008. 2018
- [20] Wirdahayati, RB and A. Bamualim. Appearance of Bali cattle and population structure of Bali cattle on the island of Timor, Nusa Tenggara Timur. Proceedings of the Bali Cattle National Seminar. Faculty of Animal Husbandry, Udayana University Bali, Denpasar. 1990
- [21] Soeparno. Meat Science and Technology. Second Edition. Gadjah Mada. University Press Yogyakarta. 2015
- [22] Hafid, H and R. Priyanto. Growth and distribution of commercial cuttings of Australian commercial cattle carcass and brahman cross from fattening products. 29 (2): 63-69. 2006