

The Effect of Age on Daily Gain, Carcass and Meat Percentage of Male Bali Cattle Fed with Complete Feed Based on Corn Silage

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Abstract- Research on the age of cattle is very important because it will determine the balance between feeding, weight gain, feed efficiency and time of finishing cattle. The purpose of this research was to investigate the effect of age on daily gain, dry matter feed intake, carcass and meat percentage of Bali cattle fed with complete feed based on corn silage. Crude protein and metabolizable energy contents of diets were 11%, and 1879.4 kcal/kg ration, respectively. The experiment used 18 heads of male Bali cattle, with three treatments and six replications. The treatments were age of the cattle: 1.5-2 years, 2.0- 2.5 years and 2.5-3 years. The cattle were housed in individual cage for three months. The results show that age of cattle had a significant effect ($p < 0.05$) on daily gain. Average daily gain 1-1.5 years was 0.340 ± 0.041 kg/head/d, 2-2.5 years was 0.363 ± 0.032 kg/head/d and 2.5-3 years that reach 0.469 ± 0.041 kg/head/d. With the increase of age, the average weight gain and feed intake also increased. The highest carcass and meat percentage was found in cattle of 2 – 2.5 years, followed by cattle of 2.5 – 3 and 1.5 – 2.0 years. The conclusion is with respect to rate of gain and feed intake, age 2.5 – 3.0 years old was the best, where-as with respect to carcass and meat percentage, age 2.0 – 2.5 years was the best.

Keywords: age, complete feed, cattle, daily gain, carcass, meat

I. INTRODUCTION

Indonesia as an agricultural country is rich in plant and animal resources. Bali cattle is a local livestock resource that has a strategic role to stabilize food security, providing power for many purposes and increasing income of the farmers. Total of Bali cattle in Indonesia in 2007 was 3.5 million heads or one-third of the total of cattle in Indonesia (Ditjennak, 2008).

In recent years, due to the decrease of grazing area for livestock, many more farmers in Indonesia have changed the raising livestock system from grazing to zero grazing (cut and carry system). The application of zero grazing system is also enhanced by the low land holding of the farmers and multiple cropping practices in which the farmers are not only raising livestock, but also growing many crops. In the zero grazing system, all nutrients needed by animals are provided by the farmers. For this purpose, the farmers collected many feed ingredients to formulate diets adjusted to the needs of specific animals and ensiling them as complete feed. The use of complete feed is more practical because it can improve of feed delivery, provide balanced nutrition for livestock, can increase the value of agricultural waste, and prevent of livestock from the use of less palatable feed ingredients.

Cattle reared in zero grazing generally come from different ages and are directed to produce meat. Sometimes they are grouped based on age and sometimes they are mixed. There is limited information concerning the effect

of age of Bali cattle fed with complete feed based diets on their growth performance and meat characteristics. Through feeding of high quality complete feed silage, growth rate of cattle will be higher and slaughtering weight of cattle can be achieved more quickly so that the quality and quantity of higher carcass.

The use of corn waste (corn hay) from agriculture can be improved in utilization by fermentation technology. Fermented corn hay quality is better and the raw material for a wide range of complete feed with a mix of local ingredients from the agricultural industry such as rice bran, molasses, pollard, corn, coconut cake, kapok seeds, cattle mix and urea.

The advantages of the complete feed are: improve efficiency in the delivery of forage with lower palatability after mixed with the concentrate can increase consumption, limit the consumption of concentrate, easy and convenient mixing forages and concentrates, livestock are easily sated and reduce dust (Surjadi, 2006). Carcass of cattle is a body part cutting results after reducing the blood, head, four legs on the bottom (ranging from carpus and tarsus), skin, gastrointestinal tract, bowel, urine, heart, throat, lungs, spleen, liver and tissues fat attached to the body, whereas the kidney is often included as carcass. The main factors to consider to assess the marketed carcass are: carcass weight, carcass pieces which can be sold (cutability) and the quality of the meat (Soeparno 1992).

Genetic and environmental factors affecting the body composition are weight distribution and chemical composition of carcass components. Environmental factors are divided into two categories namely, physiology and nutrition. Age, body weight and growth rate levels may also affect the composition of the carcass (Suryadi, 2006). The main components of the expected carcass maximum meat are optimal proportions of fat and minimal bone proportion. In general, the result of the carcass assessment was done by the percentage of carcass. The higher the percentage, the better the performance of carcass. There are two kinds of carcass weight: fresh carcass weight or carcass weight before withered and shriveled carcass weight (cold carcass weight) that is carcass weight after withered for approximately 24 hours. The percentage of carcass is affected by carcass weight, weight of livestock, conditions, breed, proportion of non carcass parts, rations provided and slaughtering method (Berg and Butterfield, 1978).

Carcass weight is one important parameter in the evaluation of carcass system. As an indicator, the carcass is not a good predictor of carcass productivity because of variations in the type of breed, nutrition and type of tissue growth causing the decrease level of accuracy. To minimize the resources of the weight of carcass diversity, it needs to be combined with other variables such as subcutaneous fat thick tendon and rib eye area (loin eye area) in predicting weight components of carcass and meat production (Priyanto et al., 1993).

Some factors that affect the production of an animal carcass are breed, sex, age and slaughter weight in addition to nutritional factors (Berg and Butterfield, 1978). Soeparno (1992) states that the increase slaughter weight carcass will yield the increase carcass as well. so that the meat section becomes larger. The higher the weight cut led to a fresh carcass weight and the percentage is also higher. In relation to age, increasing age of the cattle is in line with the live weight gain and will increase carcass weight. Meatiness is part of the carcass after the bones and most of the fat (subcutan fat and intermuscular fat) are removed. The higher the body weight of an animal, then the percentage of weight. The higher the body weight of an animal, the higher the percentage of carcass weight. Meatiness (meat containing some parts of intramuscular fat and subcutan fat that can be accepted by consumers) are influenced by several factors: breed, body weight, age, degree of obesity, carcass weight, and sex hormones (Awaluddin, 2006).

Research on the age of livestock is very important because it is associated with daily gain and the weight of maturity of ideal cut weight, feed efficiency and age of finishing cattle. Likewise the age of cattle is closely related to the carcass percentage, carcass weight and meat produced by fattening. This study aims to determine the effect of age of male Bali cattle fed with complete feed based on corn silage on daily gain, feed consumption, and percentage of carcass and meat of male Bali cattle.

II. MATERIALS AND METHODS

The study was conducted in Takalar, 80 kilometers from the city of Makassar, South Sulawesi. The study used 18 male Bali cattle with ages range from 1.5 to 3 years. The study design was randomized block design with three range of age as treatments and six replications. There are three treatments namely: A. age 1.5 - 2.0 years, B. age 2.0 - 2.5 years, and C. age 2.5 - 3.0 years. Complete feed awarded consists of corn bran, rice bran, coconut cake, kapok seeds, molasses, minerals and NaCl cattle and agricultural waste (corn silage). Complete feed protein content of 11% and energy metabolism 1879.40 kcal / kg feed. Livestock under study were kept in individual cage equipped with places for food and drink. Given feed consists of complete feed based on corn silage ad libitum given three times a day. Likewise, drinking water was available at all times during the study. Every day weighing the food provided was done to determine the feed intake and to determine the growth, the weighing was done twice a month.

The variables observed:

1. Daily feed consumption is the amount of food given less the amount of residual feed.
2. Body weight is obtained from the cattle weighing by using a 1000 kg cattle scale. Formula to determine the weight gain/cattle/day. Daily gain (kg / head / day) = final weight minus initial weight divided by period of time (days) multiplied by 100%.
3. Carcass percentage was obtained from carcass weight divided by live weight multiplied by 100%.
4. Meat percentage was obtained from meat weight divided by carcass weight multiplied by 100 %

III. RESULTS AND DISCUSSION

Effect of complete feed against daily weight gain on male Bali cattle.

Various responses of experts about the degradation of Bali cattle weight breeding were caused by inbreeding or negative selection. But on the other hand, they also said the difficulty of finding large size of male Bali cattle (bull) today was due to early selling age and low feed quality. Bali cattle are very responsive to improvement of feed. The average daily weight gain and standard deviation of male Bali cattle fed with complete feed based during the study is presented in Table 1.

Table 1. Mean and standard deviation of daily gain on male Bali cattle (kg)

Treatment of Age	Mean daily gain and s.d
A (1.5-2 years)	0.340 ^a ±0.044
B (2-2.5 years)	0.363 ^b ±0.032
C (2.5-3 years)	0.469 ^c ±0.041
Mean and s.d.	0.391 ± 0.069

Description: different superscripts in the same column show significant differences between treatments (p<0.05).

The analysis of variance shows that age has a significant effect ($p < 0.05$) on daily weight gain of male Bali cattle fed with complete feed. Bali cattle weight gain increased with the increase age of the cattle in which the older age 2.5 - 3.0 years weight gain was higher than 2.0 - 2.5 years and higher than the age 1 - 1.5 years. This shows that the older livestock, was able to respond more feed than the younger cattle. Arianto (2006) stated that the current high growth of Bali cattle is 2.5-3.0 years of age due to maximum bone condition but the growth of muscle mass. On the contrary, some livestock still need food for the growth of muscle mass, bones, and other vital organs. Daily gain of Bali cattle in this research result was about 0.340 - 0.469 kg/head/day higher than the result of Handiwirawan and Tiesnamurti (2017) research which was 0.33 kg/head/day; Kadarsih (2004) reported 0.22-0.33 kg/head/day. The differences can be achieved through the provision of good quality feed. According to Suhadji (1991), the provision of quality feed had an effect on weight gain. Another study using corn silage get a higher weight gain is 0.62 kg / head / day (Widiyazid, et al, 1999) and 0.96 kg / head / day (Hamdan et al, 2004). Daily gain of PO cattle (Onggole cross) is 0.73-0.83 kg/head/day (Nusi, et al., 2001). This difference may be due to the quality of corn silage and research environment that is in Central Java tends to be cooler than in South Sulawesi. Male Bali cattle weight gain is lower than the Madura cattle, but Bali cattle can grow up to the age of 4 years depending on environmental factors. Figure 1 shows a growth pattern / weight changes in each weighing during the study period.

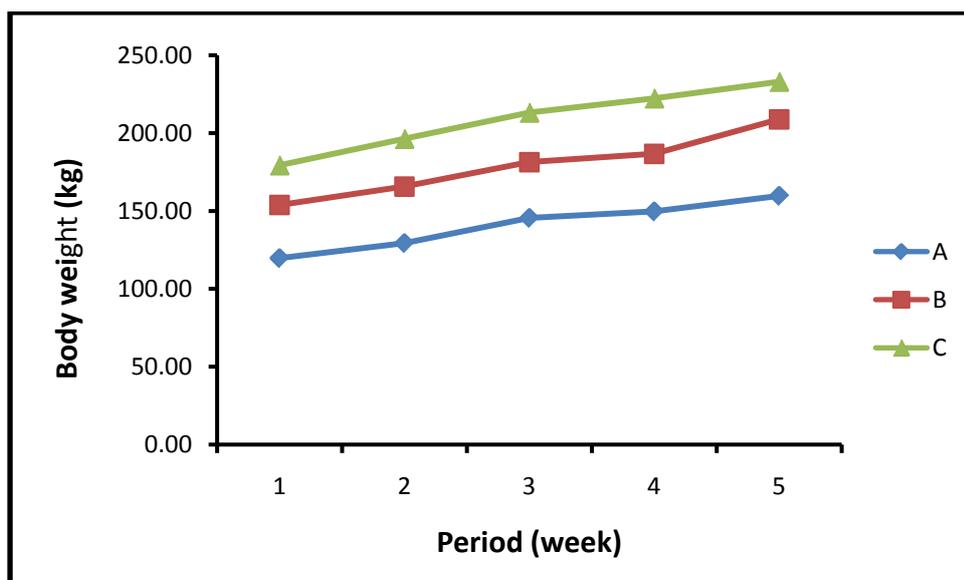


Figure 1. Changes in Body Weight of Male Bali Cattle

Figure 1 shows that weight gain of male Bali cattle at the age of more than 2.5 - 3.0 years is much higher than the age group of under two years. This shows that the age of three years is the peak age for the growth to reach ideal slaughter weight (finishing) and the Bali cattle aged three years to do short-term fattening for 3 months.

The Effect of Complete Feeding on Average Consumption of Male Bali Cattle

Results of complete consumption of male Bali cattle in different ages during the study is shown in Table 2.

Table 2. Average Feed Consumption of Male Bali Cattle in each period.

Treatment	Periods (2 week)					Averages
	1	2	3	4	5	
A	12.4	12.2	11.8	14.7	12.40 ^a	
B	15.7	15.9	16.4	17.0	17.6 16.56 ^b	
C	19.2	19.3	19.4	18.5	20.5 19.40 ^c	

Description: different superscripts in the same column show significant differences between treatments ($p < 0.05$). Treatment A : age 1.5-2 years, B : 2- 2.5 years and C : 2.5-3 years.

Analysis of variance (Appendix 3) shows that the age group has a significant effect ($P < 0.5$) on the average feed consumption. Feed consumption increases with the increase of age. Treatment 2.5-3 years was significantly different ($P < 0.05$) from age 2-2.5 years and 1.5-2 years. This is due to the increase of age feed consumption. This is in line with Depison and Sumarsono (2001) who state that the higher the weight the higher the consumption.

Feed requirements of older and heavier cattle are more though the percentage of the initial weight ratio is not much different. This indicates that the level of quality and palatability of complete feed can meet basic living needs and the production of muscle mass, bone and fat. Livestock consumption is influenced by age, feed palatability, digestibility and animal health (Judith, 2010). Maynard and Loosli (1969) state that the higher the weight, the amount of livestock feed consumed is also higher and resulted in the faster growth rate. Cow weight gain is determined by various factors: breed, sex, age, quality of feed, amount of feed consumption, environment and genetics.

The Effect of Complete Feeding on the Percentage of Carcass and Meat at Different Ages of Male Bali Cattle.

At the end of the study, slaughtering cattle was conducted to determine the effect of slaughter age on carcass and meat percentage or amount of production of Bali beef can be seen in Table 3.

Table 3. The effect of Age on the Percentage of Carcass and Meat

Item	Treatment 1)		
	A	B	C
Carcass Percentage	45.09	49.85	47.28
Meat Percentage	77.80	82.27	81.48

1) Treatment A= 1.5-2 years, B=2-2.5 years and C= 2.5-3 years.

Table 3 shows that the highest percentage of carcass and meat obtained in Bali cattle of 2 - 2.5 years: carcass percentage of 49.85% and 82.27% of meat, the age group of 2.5 - 3 years with the percentage of carcass 47,28

% and meat 81.48%, and 1.5-2.0 years with the percentage of carcass 45.09% and meat 77.80%. Carcass of male Bali cattle in this research was lower than previous research such as carcass of Bali cattle up to 55.93% (Awaluddin, 2006), carcass percentage of male Bali cattle of 2.5-3.5 years old is 53.26% (Yosita, et al, 2012). Variation in the carcass percentage of other carcass such as male Java cattle 51.02% (Sri Lestari et al. 2010) and carcass of Brahman cattle $54.86 \pm 2.53\%$ (Roviki et al, 2015). Those differences are due to location, breed, individual as well as research treatment. Carcass percentage of male Krui cattle is $48.09 \pm 2.23\%$ (Dewantara, et al, 2017). The percentage range of carcass in this study was from 45.09 to 49.85%. Berg and Butterfield (1978) state that factors affecting the production of an animal carcass are race, gender, age, slaughter weight, and nutrition. Suparno (1992) states that the increase slaughter weight also increases the weight of carcass and meat produced. Likewise, total meat is affected by the breed, body weight, age, degree of obesity, carcass weight, and sex hormones (Awaluddin, 2006).

IV. CONCLUSION

1. Older male Bali cattle consume more feed and higher daily gain compared to younger cattle.
2. Percentage of carcass and meat of the highest age 2 - 2.5 years, following 2.5 - 3 years and the lowest age of 1.5-2 years.

SUGGESTION

Male Bali cattle ages 2-3 years are good to be fattened by considering weight gain, high carcass and meat.

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