Growth Performances of Wagyu X Brahman Cross Breed in the Yearling Period

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Abstract. This study was conducted to observe the growth performance of cattle from a crossbreeding between Wagyu and Brahman cross (Wagyu-BX crossbred) in the yearling period. A total of 23 head of cattle aged 1-1.5 years old, consisting of 13 Wagyu-BX crossbred cattle and 10 Brahman cross (BX) purebred cattle, was observed at PT. Pandanaran Arta Perkasa, Klaten, Central Java for 6 months. The cattle were kept in pens with sawdust on the pen's floor. The feed consisted of forage (2 kg/day) and commercial concentrate (10 kg/day). The body length, body height, chest girth, and body weight were measured monthly. Data were analyzed using an independent sample t-test by the SPSS program 23.0 version. The average daily gain of body length, body height, chest girth, and body weight of Wagyu x BX crossbred, and BX purebred cattle were 0.10±0.03 and 0.05±0.04 cm/day, 0.07±0.04 and 0.11±0.05 cm/day, 0.15±0.06 and 0.09±0.08 cm/day, and 0.82±0.18 and 0.27±0.12 kg/day, respectively. The average daily gain of body length, chest girth, and body weight of Wagyu x BX crossbred cattle was higher ($P<0.05$) than BX purebred cattle. The body length, body height, chest girth, and body weight of Wagyu x BX crossbred and BX purebred cattle at 1.5 years old were 136.69±6.91 and 119.83±10.58 cm, 129.77±6.15 and 113.17±6 cm, 182.15±7.32 and 151.58 ±21.24 cm, 425.08±44.90 and 211.83±47.03 kg. The body length, body height, chest girth, and body weight of Wagyu x BX crossbred were greater ($P<0.05$) than BX crossbred cattle at 1.5 years old. Therefore, it was concluded that crossing with Wagyu cattle increased the growth performance of BX cattle in the yearling period.

INTRODUCTION

Changes in the lifestyle of the Indonesian people which are becoming more modern are very influential on people's consumption patterns. People with middle to upper economic levels generally like quality food products. One of the favorite livestock products is beef, especially Wagyu Beef because it has a distinctive taste. Wagyu Beef is beef that has the advantage of higher intramuscular fat content (marbling) than other beef. This causes Wagyu beef to have better tenderness, juiciness and savoriness [1]. Meanwhile, Wagyu Beef distributed in Indonesia comes from Japan, America, and Australia. Based on this, the development of beef cattle that have quality meat such as Wagyu Beef in Indonesia needs to be done.

One way to get good quality meat is to cross the Wagyu cattle. Crossing is done with cattle that have been developed in Indonesia, the breed of beef that is widely developed by the beef cattle fattening industry in Indonesia is Brahman Cross (BX) cattle imported from Australia. BX cattle have the advantages of high productivity, heat resistance, and disease resistance [2-3]. The quality of BX Beef is very far compared to Wagyu Beef. Alternatives that can be done to improve the quality of BX beef can be done by crossing BX cattle with Wagyu cattle [4]. It is hoped that the crosses between Wagyu and BX cattle will have a high level of adaptation and good quality.

One of the periods that need to be considered in the maintenance of beef cattle is the growth period before puberty or in the yearling period. During this period, livestock growth experienced a rapid increase so that it needed to be optimized in order to obtain good growth, good body conformation to increase slaughter weight and offspring in beef cattle and in brood stock. Therefore, the yearling period is often used as a period of the selection process,

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where the growth rate in that period is a criterion for selection and livestock productivity [5-6]. So far, there has been no information regarding the growth of cattle from mating Wagyu Cattle with BX in Indonesia during that period. Therefore, this study was conducted to observe the growth performance of cattle from a crossbreeding between Wagyu and Brahman Cross (Wagyu-BX Crossbred) in the yearling period.

MATERIALS AND METHODS

Ethical Clearance

This study design has been approved by the Research Ethics Commission, The Faculty of Veterinary Science, Universitas Gadjah Mada, Yogyakarta (No:0065/EC-FKH/EKs/2020).

Research Materials

A total of 23 head of cattle aged 1-1.5 years old, consisting of 13 Wagyu-BX crossbred cattle as a crossbreeding group and 10 Brahman cross (BX) purebred cattle as a control group was observed at PT. Widodo Makmur Perkasa, Klaten Regency, Central Java for 6 months. The cattle were kept in loose housing (pen) with sawdust on the pen's floor. The feed consisted of forage (2 kg/day) and commercial concentrate (10 kg/day). The concentrate contained 87.09% dry matter, 11.38% crude protein, 1.93% crude fat, 14.39% crude fiber, and 8.97% ash. The forage used were elephant grass and rice straw. Concentrated feed was given in the morning and forage in the afternoon. Drinking water was provided ad-libitum.

Data Collection and analysis

The data observed included nutrient consumption, body measurement and body weight. Nutrient consumption is calculated by subtracting the feed provided with the remaining feed which is then multiplied by the nutrient content of the feed, sampling of nutrient consumption is carried out every month for 1 week. Body measurements included body length and body height measured with a ruler, while chest girth was measured with a measuring tape. The ruler and measuring tape used were the Agrilab brands with an accuracy of 1 cm. Body weight was weighed in a chute that has been integrated with Kenko KK-300 brand scales with a max capacity of 2,500 kg and an accuracy of 0.5 kg. Body measurements and body weight were measured every 30 days started in the age of 12 month until 18 months. Data were analyzed using an independent sample t-test by the SPSS program 23.0 version.

RESULTS AND DISCUSSION

Growth is closely related to feed consumption, especially during the weaning period until puberty. Nutrient consumption of Wagyu x BX Crossbred and BX cattle in the age of 12-18 months was presented in Table 1, Feed consumption of Wagyu crossbred cattle has a higher value ($P<0.05$) than BX cattle, while for forage the difference is not significant. The difference in feed consumption between Wagyu and BX cattle is thought to be caused by the effect of different body sizes of the two breeds of cattle. Cattle with large body size will require more feed. Things that affect feed consumption are body weight, physiological status, production level, and livestock health [7-8].

TABLE 1. Nutrient Consumption of Wagyu x BX Crossbred and BX Cattle in the Age of 12-18 Months

Period (month)	Breed	Dry matter (kg/day)	Crude protein (kg/day)	Extract eter (kg/day)	Crude fiber (kg/day)
1	Wagyu x BX Crossbred	10.76±1.03[a]	1.26±0.13[a]	0.23±0.02[a]	2.56±0.18[a]
	BX	7.04±0.07[b]	0.84±0.00[b]	0.15±0.01[b]	1.85±0.03[b]
2	Wagyu x BX Crossbred	12.22±0.16[a]	1.45±0.10[a]	0.26±0.01[a]	2.86±0.06[a]
	BX	7.04±0.09[b]	0.83±0.00[b]	0.15±0.01[b]	1.80±0.03[b]
3	Wagyu x BX Crossbred	12.45±0.15[a]	1.46±0.01[a]	0.26±0.02[a]	2.95±0.05[a]
	BX	6.90±0.11[b]	0.82±0.01[b]	0.14±0.00[b]	1.75±0.04[b]
4	Wagyu x BX Crossbred	12.23±0.11[a]	1.44±0.01[a]	0.25±0.01[a]	2.87±0.03[a]
	BX	7.07±0.01[b]	0.84±0.01[b]	0.15±0.00[b]	1.82±0.00[b]

5	Wagyu x BX Crossbred	12.39±0.02[a]	1.45±0.01[a]	0.26±0.00[a]	2.92±0.01[a]
	BX	7.06±0.03[b]	0.84±0.01[b]	0.15±0.00[b]	1.81±0.01[b]
6	Wagyu x BX Crossbred	12.45±0.01[a]	1.46±0.01[a]	0.26±0.01[a]	2.93±0.01[a]
	BX	7.11±0.01[b]	0.84±0.01[b]	0.15±0.00[b]	1.83±0.00[b]

a,b the different superscripts in similar row showed a significant different (P<0.05)

The average daily gain of body measurements and body weight of Wagyu x BX crossbred and BX purebred was presented in Table 2. The average daily gain of body length, body height, chest girth, and body weight of Wagyu x BX crossbred, and BX purebred cattle were 0.10±0.03 and 0.05±0.04 cm/day, 0.07±0.04 and 0.11±0.05 cm/day, 0.15±0.06 and 0.09±0.08 cm/day, and 0.82±0.18 and 0.27±0.12 kg/day, respectively. The average daily gain of body length, chest girth, and body weight of Wagyu x BX crossbred cattle was higher (P<0.05) than BX purebred cattle.

TABLE 2. The Average Daily Gain of Body Measurements and Body Weight of Wagyu x BX Crossbred and BX Purebred

Variable	Breed (B)		Sex (S)		Significancy Breed x Sex
	Wagyu x BX	BX purebred	Male	Female	
Body length (cm/day)	0.01±0.03[a]	0.05±0.04[b]	0.07±0.04	0.08±0.04	Ns
Body height (cm/day	0.07±0.04	0.11±0.05	0.08.0.05	0.08±0.05	Ns
Chest girth (cm/day	0.15±0.06[a]	0.09±0.08[b]	0.15±0.08	0.11±0.07	Ns
Body weight (kg/day	0.82±0.18[a]	0.27±0.12[b]	0.62±0.37	0.56±0.31	Ns

[a,b] the different superscripts in similar row and treatment showed a significant different (P<0.05)
Ns: non-significant

The difference in growth in crossbred cattle with purebred cattle may be due to heterosis [9]. Kinghorn et al. [10] stated that the probability of heterosis will be at the highest point in children from the first cross from a pure nation. These results are in accordance with the research of Priyadi et al. [12] who reported that the body length of the Wagyu x BX crossbred was greater than that of the BX Cattle. The daily body length gain of Wagyu x BX crossbred cattle in this study was smaller than that of Afaloyan et al. [13] who reported that the increase in body length, gumba height and breast circumference of purebred Wagyu cattle were 0.33- 0.09 cm/day. The daily body weight gain of Wagyu x BX crossbred cattle was lower than the study conducted by Hoque et al. [14] who reported that the mean PBBH of purebred Wagyu cattle was 0.87 kg/day. In addition, the results of this study are higher with PBBH reported by Minezawa et al. [15] that the average PBBH of Wagyu cattle is 0.76 kg/day. These results indicate that the performance of the PBBH Wagyu x BX crossbred has similar criteria to its predecessor. Firdausi et al. [16] stated that the body weight gain of BX cattle can reach 1.33 kg/day. The PBBH of Wagyu cattle depends on the quality and quantity of feed given and can reach 0.73 to 1.03 kg/day [17]. Meanwhile, Komatsu and Malau-aduli [18] reported that the PBBH of male Wagyu cattle was 0.5 kg/day and females 0.46 kg/day.

The increase in body size and daily body weight of male and female cattle was not significantly different. This means that at the age of 1 to 1.5 years, gender does not affect the daily body length growth. This could be due to the fact that the male and female cattle had not yet entered sexual maturity, so they had no effect on growth. These results are in accordance with Afolayan et al research [13] which states that the growth of BX cattle will be optimal at the age of more than 18 months because they have gone through the sexual maturity phase. There is no interaction between breed and gender on daily body length gain. This is because there is no effect of sex on daily body length gain.

The body length, body height, chest girth, and body weight of Wagyu x BX crossbred and BX purebred cattle at 1.5 years old were 136.69±6.91 and 119.83±10.58 cm, 129.77±6.15 and 113.17±6 cm, 182.15±7.32 and 151.58 ±21.24 cm, 425.08±44.90 and 211.83±47.03 kg. The body length, body height, chest girth, and body weight of Wagyu x BX crossbred were greater (P<0.05) than BX crossbred cattle at 1.5 years old. The body size of Wagyu x BX crossbred cattle at the age of 1.5 years was lower than that of purebred Wagyu cattle. Afaloyan et al. [13] reported that body length, gumba height and chest circumference of pure wagyu cattle at the age of 1.5 years were 139.2, 131.8, 187 cm. Meanwhile, the body weight of the Wagyu x BX crossbred at the age of 1.5 was greater than that reported by Afaloyan et al. [13] stated that the body weight of purebred Wagyu cattle at the age of 1.5 years was 420.6 kg. Plank [19] Crossing is one of the steps to obtain cattle that have the desired characteristics in terms of

adaptation, maternal nature, and productivity. The crossing of cattle of different breeds can increase growth, reproduction, and carcass [6].

CONCLUSION

It was concluded that crossing with Wagyu cattle increased the growth performance of BX cattle in the yearling period.

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