A Growth Comparison of Ongole and European Cross Cattle kept by Smallholder Farmers in Indonesia

D. Pamungkas[1], R. Antari[1], D.E. Mayberry[2], and D.P.Poppi[2]

[1]Beef Cattle Research Institute, Indonesia, [2]University of Queensland, Australia

ABSTRACT

Increasing beef production in Indonesia requires an increase in the productivity and profitability of smallholder cattle fattening enterprises. In East Java, smallholder farmers keep many different breeds of cattle for growing and fattening prior to slaughter, but there is no published information available about how the different breeds of cattle perform under village conditions. The aim of this research was to compare the growth performance of three common breeds of beef cattle during the dry and wet seasons at the smallholder farmer level. The three breeds of cattle monitored were: Peranakan Ongole (*Bos indicus*) (PO; 26 in dry season and 22 in wet season), Ongole-Simmental cross (*Bos indicus/Bos taurus*) (SimX; 35 in dry season and 28 in wet season), and Ongole-Limousin cross (*Bos indicus*/*Bos taurus*) (LimX; 30 in dry season and 22 in wet season). Cattle were aged 1 to 2.5 years, and were kept by smallholder farmers in Pasuruan and Malang districts, East Java, Indonesia. Weight, girth and body condition score (BCS, 1-5 scale) of cattle were measured over 10 weeks in the dry season (July to September 2010) and 12 weeks in the wet season (December 2010 to March 2011). In each season, weight was measured three times and girth and BCS were measured five times. The composition and quantity of feeds offered to cattle were also recorded. Changes in weight, girth and BCS were analysed by General Linear Models using SPSS program version 14. In both seasons, average daily weight gain of SimX (0.4 kg/d) and LimX (0.4 kg/d) was higher than that of PO (0.1 kg/d). There was no difference in average daily weight gain between SimX and LimX cattle in either season. BCS of cattle increased during the wet season by 5 % from an average 3.2 out of 5. In the dry season BCS decreased from 3.9 by 9 %. Nutritive value of feed is likely to be higher in the wet season compared to the dry season. Growth of all cattle breeds was lower than expected in both seasons. This was probably due to the high proportion of poor quality feeds such as rice straw in the diets (as fed basis, 48 % at dry season and 78 % in wet season). These results highlight the large discrepancy between what is expected from research on research stations and what is achieved on farm, and indicates the huge potential for improvement in production with better diet formulation.

Key words: Growth, Condition, Beef cattle

INTRODUCTION

The Indonesian government has a program to become self-sufficient in beef by 2014. The beef cattle population in Indonesia is currently about 14.8 million (Ministry of Agriculture, 2011), with the majority (32 %) concentrated in East Java. Most beef cattle are kept by smallholder farmers in an intensive cut and carry system. The dominant cattle breeds kept by smallholder farmers in East Java are Peranakan Ongole (PO; *Bos indicus*) cattle and crosses of PO cattle with European breeds such as Limousin and Simmental (*Bos indicus/Bos taurus*).

Increasing beef production in Indonesia requires an increase in the productivity and profitability of smallholder cattle fattening enterprises, but there is no published information

available about how the different breeds of cattle perform under village conditions. The aim of this research was to compare the growth performance of three common breeds of beef cattle during dry and wet seasons at the smallholder farmer level.

MATERIALS AND METHODS

The three breeds of cattle monitored were: Peranakan Ongole (PO; 26 in dry season and 22 in wet season), Ongole-Simmental cross (SimX; 35 in dry season and 28 in wet season), and Ongole-Limousin cross (LimX; 30 in dry season and 22 in wet season). Cattle were aged 1 to 2.5 years and were kept by smallholder farmers in Pasuruan and Malang districts, East Java, Indonesia. Weight, girth and body condition score (BCS, 1 to 5 scale) of cattle were measured over 10 weeks in the dry season (July to September 2010) and 12 weeks in the wet season (December 2010 to March 2011). Due to sale of some animals, different animals were measured in each season. In each season animal weight was measured three times and girth and BCS were measured five times. The quantity of feed offered to cattle was recorded once for each animal in each season, and samples of different feed types were analysed for dry matter, organic matter, crude protein and neutral detergent fibre content during the wet season. Feed types were grouped into high quality (concentrate, molasses, cassava, ketchup waste), medium quality (native grass, elephant grass, sugarcane tops, rice bran, corn ears) or low quality (rice straw, corn stover, peanut skin) based on feed analyses. Feed offered and changes in weight, girth and BCS were analysed by General Linear Models using SPSS program version 14. The Duncan's Multiple Range Test was also used to differentiate mean among breeds and seasons.

RESULTS

Weights of PO, LimX, and SimX cattle at the start of the dry season were 224 ± 14 (SE), 284 ± 13 and 341 ± 18 kg, respectively. Weights at the start of the wet season were 235 ± 12, 294 ± 15 and 336 ± 18 kg. LimX and SimX cattle had a higher measured average daily gain (kg/d) than PO cattle in both seasons ($p<0.05$), but there was no difference in weight gain between the LimX and SimX breeds (Table 1). Within breeds, there was no difference in average daily weight gain between the wet and dry season. When we used girth to estimate weight, daily gains were higher, and there was no difference in average daily gain in girth (cm/d) or predicted daily gain (kg/d) between breeds in either season.

Table 1 Average (± SE) daily gain and change in body condition score of cattle in dry and wet seasons

	Average daily gain (kg/d)	Predicted average daily gain (kg/d)*	Average daily gain (cm/d)	Change in BCS (%/d)
Dry season				
PO	0.106 ± 0.06^{a}	0.117 ± 0.06^{a}	0.02 ± 0.01^{a}	-0.80 ± 0.12^{a}
LimX	0.355 ± 0.05^{bc}	0.237 ± 0.06^{ab}	0.04 ± 0.01^{ab}	-0.49 ± 0.15^{a}
SimX	0.362 ± 0.04^{bc}	0.272 ± 0.06^{ab}	0.05 ± 0.01^{ab}	-0.45 ± 0.11^{a}
Wet season				
PO	0.166 ± 0.04^{ab}	0.425 ± 0.07^{b}	0.07 ± 0.01^{b}	0.12 ± 0.09^{b}
LimX	0.414 ± 0.05^{c}	0.468 ± 0.07^{b}	0.08 ± 0.01^{b}	0.12 ± 0.10^{b}
SimX	0.378 ± 0.05^{c}	0.415 ± 0.06^{b}	0.07 ± 0.01^{b}	0.17 ± 0.06^{b}

* Daily gain predicted from girth/weight regression

Averages within columns followed by different letters are significantly different ($p<0.05$)

The BCS of PO cattle was lower ($p<0.05$) than LimX and SimX cattle at the start of each season, with average BCS of PO, LimX and SimX being 3.4 ± 0.1, 4.0 ± 0.1 and 4.2 ± 0.1 at the start of the dry season and 2.7 ± 0.1, 3.3 ± 0.2 and 3.5 ± 0.1 at the start of the wet season. The BCS of all breeds decreased during the dry season by an average of 9 % and increased during the wet season by an average of 5 % (Table 1). Although the PO cattle tended to lose more condition than SimX or LimX cattle in the dry season, there was no difference in change in BCS between breeds in either season.

There was no difference in the total amount of feed offered to the three breeds of cattle in the dry season, but in the wet season SimX were fed more ($p<0.05$) than PO cattle (Table 2). There was no difference in the diets offered to LimX and SimX in either season. All breeds were offered a higher proportion of low quality feeds in the wet season compared to the dry season, but LimX and SimX cattle were also offered more high quality feeds in the wet season. PO cattle were never offered any high quality feeds, and were fed a higher proportion of low quality feed compared to the LimX and SimX cattle in the dry season.

Table 2 Average (± SE) total feed offered and percentage of low, medium and high quality feeds fed to Ongole (PO), Limousin cross (LimX) and Simmental cross (SimX) cattle during the dry and wet seasons

	Total feed offered (kg as fed)	Low quality (% total)	Medium quality (% total)	High quality (% total)
Dry season				
PO	23.7 ± 1.2^{ab}	60.1 ± 3.7^{a}	39.9 ± 3.7^{a}	0^{a}
LimX	23.6 ± 2.2^{ab}	45.3 ± 3.3^{b}	50.0 ± 3.9^{ab}	4.7 ± 1.1^{bc}
SimX	26.5 ± 2.1^{ab}	40.8 ± 3.3^{b}	56.3 ± 3.8^{b}	2.9 ± 0.8^{ab}
Wet Season				
PO	20.4 ± 0.7^{a}	77.0 ± 2.9^{c}	23.0 ± 2.9^{c}	0^{a}
LimX	27.4 ± 1.1^{ab}	76.0 ± 1.8^{c}	14.2 ± 1.2^{c}	9.8 ± 1.2^{d}
SimX	28.1 ± 1.0^{b}	79.2 ± 2.5^{c}	12.5 ± 1.9^{c}	8.2 ± 1.2^{cd}

Averages within columns followed by different letters are significantly different ($p<0.05$)

DISCUSSION

Our results show that SimX and LimX cross cattle perform better than PO cattle at the smallholder farmer level in East Java, Indonesia. There are two possible explanations for this result. Firstly, crossbred cattle usually have higher growth rates than local cattle due to hybrid vigour. For example, Purnomoadi et al. (2003) fed PO and LimX steers rice straw and concentrate in a 60:40 ratio. Feed intake of both breeds was 2.8 % liveweight (DM basis), but growth of PO steers was only 0.24 kg/d, compared to 0.47 kg/d for LimX steers. Secondly, the LimX and SimX cattle in this study were fed diets containing higher proportions of high quality feeds compared to the PO cattle (Table 2). This suggests that smallholder farmers understand that European Cross cattle have higher energy and protein requirements compared to local Ongole cattle, or are feeding in response to higher market prices for crossbred cattle. However, it is possible that if all three breeds of cattle in this experiment were fed similar quality diets, the differences in growth rates between the breeds may have been smaller or not statistically significant.

The growth rates of all breeds of cattle in this study were lower than expected (Table 1). Average growth of LimX and SimX cattle was 0.4 kg/d, and PO cattle was 0.1 kg/d. In comparison, Moran (1985) recorded a daily gain of 0.65 kg/d for PO bulls fed a roughage

based diet (70 % grass and 30 % concentrate, DM basis) and 0.81 kg/d for bulls fed a concentrate diet. Cruz de Carvalho et al. (2010) reported growth rates of 0.86 kg/d for PO cattle and 0.99 kg/d for SimX cattle fed a high concentrate diet in a feedlot system. These results suggests that the reason for the low growth rates recorded in this study is likely due to the high proportion of poor quality feeds such as rice straw in the diets of all cattle (as fed basis, 48 % in dry season and 78 % in wet season). Indonesian smallholder farmers cannot afford high energy and protein supplements to increase the quality of diets fed to cattle. However, the use of tree legumes, elephant grass, rice bran and cassava by-products provide some low cost options for farmers to increase the protein and energy content of the cattle diets.

Our results also showed that although growth rates tended to be higher in the wet season than the dry season, differences in average daily gain (weight) between seasons were not significant for any of the breeds measured. In contrast, results for gain in girth and weight gain predicted from girth indicated that growth was higher in the wet season for all breeds of cattle. This was supported by the BCS data, with BCS of cattle increasing during the wet season by 5 % from an average 3.2 out of 5, and decreasing from 3.9 by 9 % in the dry season. It is difficult to regularly weigh animals in villages and factors such as rumen fill may have influenced the results. Higher weight gain in the wet season compared to the dry season is expected because forages and crop residues available during the wet season would likely contain higher protein and lower fibre than those harvested in the dry season (Evitayani et al. 2004). Nevertheless, the results show that within villages live weight gain is much less than expected from on-station experiments and demonstrates the huge potential to increase production within villages.

ACKNOWLEDGMENTS

This research was funded by the Australian Centre for International Research. The authors would like to thank Theo Mahiseta Syahniar, Fuad Cahyadi, Dadang Budi Cahyono, Tri Wahyudi, and Sriyana for their help collecting the data used in this paper.

REFERENCES

Cruz de Carvalho, M., Soeparno and N. Ngadiyono. 2010. Growth and carcass production of Ongole crossbred cattle and Simmental Ongole crossbred cattle reared in a feedlot system. Buletin Peternakan. 34(1): 38-46.

Evitayani, L. Warly, A. Fariani, T. Ichinohe and T. Fujihara. 2004. Seasonal changes in nutritive value of some grass species in West Sumatra, Indonesia. Asian-Aust. J.Anim. Sci. 17:1663-1668.

Purnomoadi, A., W. Bela and S. Dartosukarno. 2003. Eating behavior of Ongole crossbred and Limousin crossbred steers fed fermented rice straw and concentrate. Jurnal Ilmu Ternak dan Veteriner. 8(4): 276-280.

Ministry of Agriculture. 2011. Hasil Sensus Nasional Sapi Potong, sapi Perah dan Kerbau. PSPK 2011). Badan Statistik Indonesia.

Moran, J. 1985. Comparative performance of five genotypes of Indonesian large ruminants. 1. Effect of dietary quality on liveweight and feed utilization. Aust. J. Ag. Res. 36(5): 743-752.