Carcass and Beef Characteristic from Brahman Cross Steers Fattened in Feedlot Prepared for Traditional Market

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ABSTRACT

Beef cattle feedlot is a fast growing industry in Indonesia. The industry supplies beef for particular market (hotel, restaurant and institution) as well as traditional market. This study was aimed to examine carcass and beef characteristics from Brahman Cross (BX) steers slaughtered at different slaughter weight, and also fat thickness categories prepared for traditional market. The study involved 40 heads of feeder cattle of Brahman Cross steer fattened on concentrate based ration and slaughtered at four slaughter weight categories (301-350 kg, 351-400 kg, 401-450 kg and 451-500 kg), and three fat thickness categories (2.5-4.5 mm, 5.0-7.0 mm and 7.5-9.5 mm). The carcass characteristics observed included hot carcass weight, dressing percentage, twelfth rib fat thickness, loin eye area, estimated lean weight and percentage and estimated fat weight and percentage. The beef characteristics observed included meat tenderness, cooking loss, water holding capacity, marbling score, meat and fat colors. The experiment was set up in a completely randomized design with slaughter weight category, and also fat thickness category as the treatment. Results of the study indicated that slaughter weight category significantly ($P<0.05$) affected hot carcass weight, estimated lean and fat weights, while dressing percentage, twelfth rib fat thickness, estimated lean and fat percentages were not significantly influenced by slaughter weight category. Fat thickness category did not have significant effects on hot carcass weight, dressing percentage, rib eye area and lean weight but this fat category significantly ($P<0.05$) affected estimated lean percentage, estimated fat weight and percentage. Neither slaughtered weight nor fat thickness categories had obvious effects on beef characteristics. It was apparent that slaughter weight and fat thickness categories were not a limiting factor for beef quality traits but the carcass productivity traits.

Key words: Brahman cross steer, fattening, carcass and beef characteristics, traditional market

INTRODUCTION

Local cattle have been primarily supplying beef for traditional market. The high demand for beef has stimulated the fast growing feedlot industry using imported feeder cattle from Australia, which amounted to 400,000 heads annually (Direktorat Jenderal Peternakan, 2008). Cattle feedlot industry in Indonesia has grown rapidly in order to fulfill quality beef for supplying particular market such as hotels, restaurant and institution. Recently, the feedlot industry also supplies traditional market since there was a shortage of local cattle. Halomoan *et al*. (2001) reported finished cattle at lighter slaughter weight, approximately 372 kg, for traditional market and heavier slaughter weight, approximately 511 kg for particular market. Carcass weight and fat thickness have been identified as indictors of a carcass' productive traits (Johnson *et al*., 1997; Priyanto *et al*., 1997; Priyanto *et al*., 1999; Hafid and Priyanto, 2006). The two factors have long been used as a basis of beef carcass evaluation (Kempster *et al.*, 1982). The following study examined the effects of slaughter weight and fat thickness categories on carcass and beef characteristics from Brahman Cross (BX) steers fattened in feedlot.

MATERIALS AND METHODS

Cattle and Procedures

The study involved 40 heads of 2 year-old Brahman Cross steers with initial live-weight averaging 220 - 335 kg. They were fattened on concentrate based ration containing 14 % crude protein and 75 % TDN for approximately two months. The steers were prepared for traditional market and sequentially slaughtered at four

slaughter points; those were 301 - 350 kg, 351 - 400kg, 401 - 450 kg and 451 - 500 kg. All steers were fasted but access to water 24 hours prior to slaughter. They were then slaughtered according to common practice applied in the state slaughter house. Following dressing, the carcasses were weighed and divided into two sides. Measurements were taken on the right side of the carcass. Based on twelfth rib fat thickness measurement, the carcasses were grouped into three fat thickness categories, namely 2.5 – 4.5 mm, 5.0 – 7.0 mm and 7.5 – 9.5 mm. The weights and percentages of lean and fat were estimated according to the regression equations described by Priyanto (1993). Meat sample was taken on the Longissimus dorsi muscle between 12^{th} and 13^{th} ribs in order to obtain measurements of beef properties.

Data Analysis

The experiment was set up in completely randomized design with slaughter weight and fat thickness categories as the factor. The data were statistically analyzed using analysis of variance. Significant differences between treatments were further tested by Duncan Multiple Range Test (Steel and Torrie, 1993). The carcass characteristics observed were hot carcass weight, dressing percentage, twelfth rib fat thickness, loin eye area, estimated lean weight and percentage and estimated fat weight and percentage. The beef characteristics observed included meat tenderness (shear force value), water holding capacity, cooking loss, marbling score, meat and fat colors.

RESULTS AND DISCUSSION

Carcass Characteristics

It is a common practice that slaughter weight was used to determine economic value of beef cattle in domestic market. Table 1 summarizes the carcass characteristics of lot fed Brahman Cross steers which were prepared for traditional market and grouped according to slaughter weight category.

As shown in Table 1, increased slaughter weight resulted in significantly ($p<0.05$) increased carcass weight and therefore estimated lean weight. The estimated fat weight increased significantly ($P<0.05$) with increasing slaughter weight despite the twelfth rib fat thickness was not obviously affected by slaughter weight of beef cattle. The beef carcass prepared for traditional market in this study had low fat thickness, averaging 5.24 mm (3 – 9 mm).

Table 1. Carcass characteristics of brahman cross steers according to slaughter weight category

Parameter	Slaughter Weight Category (kg)			
	3001-358	351 – 400	4001 – 450	451 – 500
Carcass weight (kg)	169.64[a]	192.42[b]	207.43[c]	224.00[d]
Carcass dressing (%)	49.90	50.32	49.70	48.62
12^{th} rib fat thickness (mm)	4.73	5.58	5.32	5.33
Loin eye area($inch^2$)	16.30[a]	13.38[b]	14.74[a]	12.29[a]
Estimated lean (kg)	98.48[a]	111.42[b]	120.95[c]	130.92[d]
Estimated lean (%)	64.14	63.68	63.82	63.81
Estimated fat (kg)	27.75[a]	33.18[b]	35.36[bc]	38.33[c]
Estimated fat (%)	17.62	18.50	18.23	18.24

Note: means in the same rows followed by a different superscripts indicate significant differences (P<0,05).

Table 2. Carcass characteristics of Brahman Cross Steers according to fat thickness category

Parameter	Fat Thickness Category (mm)		
	2.5 – 4.5	5.0 – 7.0	7.5 – 9.5
Carcass weight (kg)	193.17	193.00	198.60
Carcass Dressing (%)	50.12	49.19	51.21
Loin eye area ($inch^2$)	14.43	15.45	12.53
Estimated lean (kg)	114.05	111.38	112.03
Estimated lean (%)	64.63[a]	63.52[b]	62.27[c]
Estimated fat (kg)	30.07[a]	33.95[b]	39.02[c]
Estimated fat (%)	16.68[a]	18.81[b]	21.18[c]

Note: means in the same rows followed by a different letter differ significantly (P<0.05).

Halomoan *et al*. (2001) reported that beef carcass destined for traditional market required lower fat thickness as high carcass fat thickness would resulted in excessive fat trimming and consequently lowered beef yield. Whilst there were significant differences ($P<0.05$) in loin eye area observed between slaughter weight classes, the values did not follow any particular pattern (Table 1). It was suggested that fat thickness and loin eye area were inadequately associated with carcass weight. In light weight carcasses, as in this study, carcass weight was strongly associated with carcass lean and fat weights (Johnson *et al*., 1997). Nevertheless, overall carcass composition was not influenced by slaughter weight category. This was indicated by similar values of lean percentages and fat percentages among slaughter weight points. Unlike the effects of slaughter weight category, the effects of fat thickness category was significant ($P<0.05$) for estimated carcass fat weight and percentage, and estimated carcass lean percentage. The other carcass characteristics as carcass weight, dressing percentage, loin eye area and carcass lean weight were not markedly influenced by fat thickness category (Table 2).

Increases in fat thickness of the beef carcass in this study would be followed by significant increases of the weight and percentage of carcass fats and conversely significant decrease of carcass lean percentage. In light weight carcasses, Johnson *et al*. (1997) reported that subcutaneous fat thickness alone could predict carcass composition with high degree of accuracy.

Carcass weight and fat thickness are two main factors determining the value of a carcass. They are used for carcass classification in beef marketing (Kempster *et al*., 1982). It has been well established that subcutaneous fat thickness was shown to be the most important variable in percentage-based prediction while carcass weight was the major contributor in weight-based prediction (Butterfield, 1965; Johnson *et al*., 1997). Beside other indicators, carcass weight and subcutaneous fat thickness have been used as the main indicators of carcass productivity in carcass evaluation scheme (AMLC, 1991; USDA, 1997).

Beef Characteristics

Beef evaluation was accentuated particularly on physical characteristics including tenderness (shear force value), water holding capacity (WHC, measured from percentage water loss), cooking loss, marbling score, meat and fat colors. The effects of slaughter weight and fat thickness categories on the physical characteristics of beef were summarized in Table 3 and Table 4 respectively.

Neither slaughter weight nor fat thickness categories had significant influence on all physical characteristics of beef. The overall means of meat tenderness, WHC, ooking loss, marbling score, meat and fat colors were 6.27kg/cm^2, 29.86%, 42.25%, 1.78, 4.05 and 1.83 respectively. Wahyuni (1998) reported tenderness, WHC and cooking loss of beef from Brahman Cross 8.03 kg/cm^2, 46.59% and 46.63% while Amri (2000) reported on steer of the same breed that those values were 7.80 kg/cm2, 22.68 % and 41.18%. The slightly different values of the respective traits might be due to the variation in live weight and age of cattle. These results indicated that such categories failed to differentiate beef quality properties in light weight carcass.

Table 3. Beef characteristics of Brahman Cross Steers according to slaughter weight category

Parameter	Slaughter Weight Category (kg)			
	3001-358	351 – 400	4001 – 450	451 – 500
Meta tenderness (kg/cm^2)	6.01	7.02	5.87	6.09
WHC (%)	30.98	29.29	20.77	28.40
Cooking loss (%)	42.59	42.78	39.34	39.16
Marbling score	1.64	1.92	1.79	1.67
Meat color	3.82	4.92	3.79	4.33
Fat color	2.09	2.00	1.64	1.00

Table 4. Beef characteristics of Brahman Cross Steers according to fat thickness category

Parameter	Fat Thickness Category (mm)		
	2.5 – 4.5	5.0 – 7.0	7.5 – 9.5
Meat tenderness (kg/cm^2)	5.97	6.43	6.81
WHC (%)	29.90	30.13	28.77
Cooking loss (%)	42.61	38.33	46.31
Marbling score	1.94	1.71	1.40
Meat color	3.89	4.23	5.00
Fat color	2.17	1.35	2.20

CONCLUSIONS

In feed-lot Brahman Cross steer prepared for traditional market, it is concluded that slaughter weight and fat thickness categories were not a limiting factor for beef quality traits but the carcass productivity traits. Lean and fat weights increased with increasing carcass weight while lean percentage decreased and conversely fat percentages increased with increasing carcass fatness.

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