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CARCASS PERFORMANCE OF HEIFERS AND BULLS OF DIFFERENT BREEDS

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Abstract

This study aimed to evaluate and compare performance of body weight (BW) at slaughter, hot carcass weight (HCW) and dressing-out percentages (DP%) of bulls and heifers of different breeds. The data from heifers (84) and bulls (90) for sex; and for breeds of Simmental (58), Holstein (62) and their crosses (S×H) (54) were used as174 animals in total. BWs of each breed were 486.5, 485.6 and 462.2 for Holstein, Simmental and crosses, respectively. BWs of sex were 482 kg for both bulls and heifers. There were significant differences (P<0.05) in HCW and DP% between sexes. HCW of bulls and heifers were 257.68 and 245.58 kg, respectively. DP% for bulls and heifers were 53.68 % and 51.15 % respectively. There were significant differences (P<0.05) in HCW and DP% between breeds. HCW and DP% of Simmentals were greater than the other breeds while they were not significant (P>0.05) for Holstein and Crosses. There was no significant (P>0.05) breed and sex interaction for HCW and DP%. Simmental bulls and heifers were heavier than those of other breeds for HCW and DP%. It was observed that the performance of bulls and heifers of Crosses were better than Holstein bulls and heifers performance.

Key words: *carcass, performance, heifers, bulls, breeds.*

INTRODUCTION

Despite the continuing trend of growth in beef consumption in Turkey over the years, beef producers are increasingly facing problems of decrease in profitability of production, which in turn requires them to research more deeply into factors associated with the success of their business. Breeds and sex type of animals continue to be one of the key components of such production facilities. Numerous studies confirm that breeds and genotypes of cattle have unequal adaptability and productivity in different natural environmental conditions (Aslam et al., 2002; Charles et al., 2012; Demircan et al., 2007).

Beef production is an important sector of agriculture in many countries. The type of beef industry that develops in any country depends largely on climate and terrain types. It is also related to the size of agricultural holdings and the general structure of the cattle industry, in particular the association between beef and milk production (Allen and Kilkenny, 1984)

Beef production methods have changed significantly since the Second World War towards more planned beef production systems. The main reason for the change is that it makes it difficult for the old systems to be economically viable in their land and labor needs.

This allowed to concentrate on an increase in the production scale and, to keep the optimum number of animals in a smaller area and thus to use more land for other agricultural enterprises (King, 1978).

Various published reports on beef performance of different breeds have been made available and compared feedlot and carcass characteristics of different breeds of bulls and heifers finished under different feeding conditions and slaughtered at different bodyweights (Steen, 1995; Steinwidder et al., 2002).

It appears that the bulls and heifers of even the same breed slaughtered at the same age might have different carcass performances. The results of such comparisons including different breeds are, however, limited in the literature.

Therefore, in this study it was aimed to evaluate and compare performance differences such as BW at slaughter, hot carcass and dressing-out percentages of bulls and heifers of different breeds.

MATERIALS AND METHODS

Experimental Location

This study was carried out in a commercial slaughterhouse in 2017 in Isparta province (37°45′N, 30°33′E, elevation 1035 m) located in the west Mediterranean region of Turkey.

Animals

Slaughter groups were formed according to breeds and sexes at almost the same weight from the animals slaughtered at the same abattoir. Total number of animals involved in the experiments was 174 head of bulls and heifers cattle which included 90 heads bulls and 84 heads heifers. The data for breeds used were Simmental (58), Holstein (62) and their crosses (Simmental×Holstein, S×H) (54) in the experiment. The age of the animals used in this study ranged from 17 to 19 months old at the time of slaughter.

Statistical Analysis

The analysis of variance of the data for breed and sex types were analyzed by GLM (General Linear Model) procedure by statistical software program (Minitab v.16), using the following model:

$$Y_{ijk} = \mu + \alpha_I + \beta_j + \gamma_k + \phi_l + \alpha\beta_{ij} + \varepsilon_{ijkl}$$

Where:

Y_{ijk} is the $_{ijk}$th observation of animal weight;

μ is the overall mean;

α_i is the effect of breed type;

β_j is the effect of sex type;

γ_k is the effect of BW at slaughter;

ϕ_l is the effect of age at slaughter;

ε_{ijkl} is the residual effect or random error associated with the individual animal;

$\alpha\beta_{ij}$, is the two-way interactions of breed × sex.

Breed and sex type were fitted as fixed effects, and although slaughter groups were designed to set up at the same weight, the age and BW at slaughter was included in the model as a covariate (479 kg approximately). The significance of differences between individual breed and sex means were examined using Scheffé's pair-wise comparison test.

RESULTS AND DISCUSSIONS

The average performance comparisons of breeds and sex types for BW at slaughter, HCW and DP% are shown in Table 1 respectively.

Average BW at slaughter of each breed were 486.5, 485.6 and 462.2 for Holstein, Simmental and crosses, respectively. Average BW at slaughter of sex were 482 kg for both bulls and heifers. There were significant differences ($P<0.05$) in HCW and DP% between sexes. Average HCW of bulls and heifers were 257.68 and 245.58 kg, respectively. Mean DP% for bulls and heifers were 53.68% and 51.15% respectively. A higher carcass performance ability for bulls compared to heifers, as shown in this study, has been well reported previously and the results were in line with those found in literature (Tanner et al., 1970; Steen, 1995; Link et al., 2007; Bures and Barton, 2012; Bozkurt, 2012). As expected, the lower dressing-out proportion for heifers was mostly due to their markedly higher deposition of internal fat compared to bulls. This is in agreement with other studies comparing carcass traits in bulls and heifers (Steen, 1995; Frickh et al., 2002; Velik et al., 2008; Bures and Barton, 2012).

There were significant differences ($P<0.05$) in average HCW and DP% between breeds. HCW and DP% of Simmental breeds were greater than the other breeds while there were no significant differences ($P>0.05$) in HCW and DP% between Holstein and Crosses. Average HCW of Simmental, Holstein and crosses were 257.39, 246.39 and 251.11 kg, respectively. Mean DP% for breeds of Simmental, Holstein and crosses were 53.62%, 51.41% and 52.21%, respectively.

Table 1.Performance comparison means of breeds and sex types

BREED TYPES	N	BW (kg)	HCW (kg)	DP (%)
Simmental	58	485.6	257.39^{A}	53.62^{a}
Holstein	62	486.5	246.39^{B}	51.41^{b}
Crosses (S×H)	54	462.2	251.11^{B}	52.21^{b}
SEX TYPES				
Bulls	90	482.2	257.68^{C}	53.68^{e}
Heifers	84	482.1	245.58^{D}	51.15^{f}

BW: Body Weight at Slaughter; HCW: Hot Carcass Weight; DP: Dressing-out Percentages.

The least square means and interaction effects of breed and sex typeonperformance (BWat slaughter, HCW and DP%) are shown in Table 2.

Table 2. Least square means and interaction of breed and sex types on performance

BREED TYPES	SEX TYPES							
	Bulls				Heifers			
	N	BW (kg)	HCW (kg)	DP (%)	N	BW (kg)	HCW (kg)	DP (%)
Simmental	30	482.2	261.42^{A}	54.51^{a}	28	489.0	250.35^{B}	52.74^{b}
s.e.		(1.68)	(2.08)	(0.431)		(13.0)	(2.16)	(0.448)
Holstein	30	482.1	255.14^{A}	53.21^{a}	32	490.9	237.65^{C}	49.60^{c}
s.e.		(0.186)	(2.08)	(0.431)		(9.06)	(2.03)	(0.420)
Crosses (S×H))	30	482.2	256.48^{A}	53.31^{a}	24	442.2	245.75^{BC}	51.11^{bc}
s.e.		(0.517)	(2.08)	(0.431)		(16.4)	(2.43)	(0.503)
Total Means		482.2	257.68	53.68		482.1	245.58	51.15

Standard errors (s.e.) of the means are shown in brackets
BW: Body Weight at slaughter; HCW: Hot Carcass Weight; DP: Dressing-out Percentages.
Significant differences for HCW are shown as capital superscripts, significant differences for DP% are shown as lowercase superscripts at 5% significance level.

The body weights of bulls and heifers were taken as covariate in general linear models.

There was no significant (P >0.05) breed and sex interaction for HCW and DP%. In another study carried out by Bozkurt (2012) found that both breeds performed similarly; moreover, there was no significant interaction between breeds.

It was found that there were no significant differences (P>0.05) in HCW and DP% of bulls of breeds. Average HCW and DP% of Simmental bulls, Holstein bulls and bulls of Crosses were 261.4, 255.1 and 256.5 kg, respectively and 54.51%, 53.21% and 53.31%, respectively.

It was observed that there were also significant differences (P <0.05) in HCW values of heifers of breeds. Average HCW for Simmental heifers, Holstein heifers and Crosses heifers were 250.35, 237.65 and 245.75 kg respectively. While the differences (approximately 13 kg) in HCW values between Simmental and Holstein heifers were significant (P<0.05), there were no significant differences (P>0.05) in HCW (approximately 5 kg) between Simmental and Crosses heifers (S×H) and also between Holstein heifers and crosses heifers (8.1 kg)

Similarly, there were significant differences (P <0.05) in DP% values of heifers of breeds. Average DP% for Simmental heifers, Holstein heifers and Crosses heifers were 52.74%, 49.6% and 51.11%, respectively. While the differences (approximately 3%) in DP% values between Simmental and Holstein heifers were significant (P <0.05), there were no significant differences (P >0.05) in DP% (approximately 1.5 %) between Simmental and Crosses heifers (S×H) and also between Holstein heifers and crosses heifers (1.5%).

Although there was no significant (P >0.05) breed and sex interaction for HCW and DP%, Simmental breed of bulls and heifers were heavier than those of other breeds for HCW and DP%.

There are many well documented reports of breed comparisons however, as Keane et al. (1989), Keane and More O'Ferrall (1992) suggested that the results of such comparative studies, including those results of performance of breeds presented in this study, are not necessarily applicable outside the countries where the experiments were conducted due to the differences in factors such as production systems, slaughter weights, climate and management conditions.

CONCLUSIONS

It was observed that Simmental breed animals regardless of sex types were superior to those of other breeds. However, the performance of bulls and heifers of crosses were better than Holstein bulls and heifers performance.The results of this study confirmed that carcass performanceof bulls of all breeds was found to be higher than the heifers of the breeds studied. However, carcass performances of Simmental×Holstein crosses were higher than those of Holstein heifers.

In addition, other measures, such as growth rate, feed conversion efficiency and carcass and bodyweight at slaughter including management conditions, are important parameters that need to be considered for further study to ensure comprehensive breed comparisons.

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