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SEASONAL PERFORMANCE OF DIFFERENT BREEDS OF FEEDLOT BEEF CATTLE GROWN UNDER THE MEDITERRANEAN CONDITIONS

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Abstract

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In this study, data from Holstein (11), Brown Swiss (27), Simmental (8) cattle as European type (ET) and Boz (12) and Gak (48) as Indigenous type (IT) grown under feedlot conditions were used to evaluate and compare performance differences in the Mediterranean type of climate, covering summer, autumn and winter seasons.

Initial average weights of cattle were 202, 194, 210, 203 and 220 kg for Holstein, Brown Swiss, Simmental, Boz and Gak repsectively. There were statistically significant ($P< 0.05$) differences in daily live weight gains (DLWG) of both type of cattle. ET cattle were performed better than IT cattle for all seasons. There were no statistically ($P< 0.05$) significant differences in performance between Holsteins, Brown Swiss and Simmental cattle and between Boz and Gak cattle themselves. However, Simmentals tended to perform better than the rest for all seasons, following Holsteins, Brown Swiss, Boz and Gak respectively. There was no significant ($P> 0.05$) interaction between seasons and breed types. Overall DLWGs of animals in winter (0.80 kg/day) was statistically higher ($P< 0.05$) than those of both summer and autumn (0.68 and 072 kg/day respectively) which was not statistically significant.

The results showed that under the Mediterranean conditions the ET cattle were better suited to the feedlot beef systems than IT cattle. The higher overall performance of cattle in winter indicated that animals might suffer from heat stress during summer, causing a decrease in performance in the Mediterranean conditions.

Key words: beef cattle, performance, live weight gain, seasons, feedlot
Abbreviations: ET: European type, IT: Indigenous type, DLWG: Daily Live Weight Gains, GLM: General Linear Model, FW: Final Weight, TWG: Total Weight Gain, IW: Initial Weight

Introduction

Beef production constitutes an important sector of the agricultural industry of many countries. The type of beef industry which develops in any country depends largely on climatic conditions and land types. It also depends on the size of agricultural holdings and the overall structure of the cattle industry especially the relationship between beef and dairy production (Allen and Kilkenny, 1984).

Beef production methods have changed markedly since the Second World War towards more planned beef production systems. The main reason for the change is that the older systems became too demanding in their requirements for land and labour to be economically viable. This has led to intensification, coupled with an increase in the scale of production, or alternatively, to the keeping of the original number of animals in a smaller area, which allows more land to be used for other farming enterprises (King, 1978).

In Turkey where there is a much smaller range of farming environments divided mainly into smaller farms, beef is produced primarily as a by-product of milk production and the cattle are mainly dual purpose for milk and beef.

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There is little or no information on the comparative feedlot performance of European breeds with local breeds and their crosses especially under the Mediterranean climatic conditions. Therefore, this study was aimed to provide some information on seasonal feedlot performance characteristics of breeds grown in the Mediterranean part of the country.

Materials and Methods

The study involved 106 beef animals and was conducted at the Suleyman Demirel University Research Farm. The present study included 11 Holstein, 8 Simmental, 27 Brown Swiss as 46 European type (ET) in total with a mean initial weight of 203 kg; 12 Boz, 48 Gak breed animals as 60 Indigenous type (IT) in total with a mean initial weight of 202 kg. All specimens were approximately six months old and initial average weights of cattle were 202, 194, 213, 203 and 222 kg for Holstein, Brown Swiss, Simmental, Boz and Gak respectively.

The experiment lasted for 7 months. Animals were approximately six months old were kept in feedlots with four pens. Animals were initially weighed at the beginning of the experiment and were divided into groups according to their weights. Each group was weighed and monitored on a fortnightly basis.

Sugar beet bulb and dried hay as roughage and ground barley and cotton seed meal as concentrates were provided to obtain a target live weight gain of 1 kg/day and designed according to live weight change of the animals.

The data for breed types and seasons were analyzed by GLM (General Linear Model) procedure (Minitab v.14), using the following model:

$$Y_{ijk} = \mu + \alpha_i + \beta_j + \gamma_k + \alpha\beta_{ij} + \varepsilon_{ijk}$$

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 season,

γ_k is the effect of initial weight,

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

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

Breed type and season factors were fitted as fixed effects, and initial weight was included in the model as a covariate. (210 kg approximately). The significance of differences between individual breed and season means were examined using Scheffé's pair-wise comparison test.

Results and Discussion

The least-square means and standard errors for live weights for breed types and seasons are shown in Tables 1 and 2 respectively.

There were significant ($P < 0.05$) differences between breed types for final weight (FW), total weight gain (TWG) and DLWG. ET cattle performed better than IT cattle in all parameters observed (DLWG, 0.903 *vs* 0.606 kg/day). However, there were no significant ($P > 0.05$) differences in performance of cattle among the same breed types. Mean daily liveweight gains for Holstein, Brown Swiss, Simmental, Boz and Gak cattle were 0.919, 0.876, 0.971, 0.656 and 0.593 kg respectively.

Overall DLWGs of animals in winter (0.800 kg/day) was statistically higher ($P < 0.05$) than those of both summer and autumn (0.680 and 0.726 kg/day respectively) which was not statistically significant. There was no significant ($P > 0.05$) interaction between seasons and breed types. The higher overall performance of cattle in winter indicated that animals might have suffered from heat stress during summer, causing a decrease in performance in the Mediterranean conditions.

Simmentals tended to perform better than the rest of the breeds for all seasons, following Holsteins, Brown Swiss, Boz and Gak respectively. These results were in line with statement that breeds and crosses of beef cattle show distinctive differences in size, earliness of maturity and carcass characteristics. Large breeds grow faster than smaller breeds. Early-maturing breeds finish at a faster rate than late-maturing breeds (Wilkinson, 1985). Conformation and growth potential vary greatly between different breeds of cattle. While there are certainly differences between breeds in growth rate, the live weight gain, which can be achieved from a given area of, grass or quantity of feed, is similar for most breeds, if each breed is fed and managed according to its own particular requirements (Wilkinson, 1985).

The superior weights of European type cattle in this study were in agreement with the results of some pub-

Table 1
Over all performance comparisons of breed types*

Breed type	N	IW (kg)	s.e.	FW (kg)	s.e.	TWG (kg)	s.e.	DLWG (kg)	s.e.
ET Cattle	46	203[a]	5.7	396[a]	7.8	193[a]	3.3	0.903[a]	0.015
Holstein	11	202[ab]	8.3	398[a]	9.6	196[a]	5.4	0.919[a]	0.034
Brown Swiss	27	194[a]	8.5	386[a]	11.7	192[a]	4.7	0.876[a]	0.021
Simmental	8	213[ab]	11.9	423[a]	13.1	210[a]	4.5	0.971[a]	0.020
IT Cattle	60	212[b]	4.2	351[b]	5.5	139[b]	2.9	0.606[b]	0.013
Boz	12	203[ab]	10.5	345[b]	13.9	142[b]	7.3	0.656[b]	0.033
Gak	48	222[b]	4.5	352[b]	5.9	130[b]	3.1	0.593[b]	0.014

* The means with the same superscripts within the same columns are not statistically significant (P >0.05).

Table 2
Seasonal performance of breed types on the basis of DLWGs*

Breed type	N	Summer	s.e.	Autumn	s.e.	Winter	s.e.
ET Cattle	46	0.813[a]	0.028	0.911[a]	0.017	0.982[a]	0.020
Holstein	11	0.824[a]	0.064	0.928[a]	0.026	1.016[a]	0.028
Brown Swiss	27	0.800[a]	0.041	0.881[a]	0.024	0.940[a]	0.027
Simmental	8	0.842[a]	0.035	0.984[a]	0.036	1.077[a]	0.039
IT Cattle	60	0.578[b]	0.021	0.584[b]	0.017	0.665[b]	0.024
Boz	12	0.594[b]	0.022	0.657[b]	0.031	0.718[b]	0.057
Gak	48	0.575[b]	0.057	0.566[b]	0.019	0.652[b]	0.027
Overall	106	0.680	0.020	0.726	0.020	0.800	0.022

* The means with the same superscripts within the same columns are not statistically significant (P >0.05).

lished reports in literature. The results showed that under the Mediterranean conditions ET cattle were better suited to the feedlot beef systems than IT cattle.

There are many published reports of breed comparisons however, as Keane et al., (1989) and Keane and More O'Ferrall (1992) pointed out that the results of these comparisons, including those reported in this study are not necessarily applicable outside the countries where the experiments were carried out due to the differences in factors such as production systems, slaughter weights and climate, etc.

Conclusions

Although the results indicated that under the Mediterranean conditions ET cattle were better suited to the feedlot beef systems than IT cattle, it can be concluded that the breed comparison results obtained in this study were based on live weight change only. However, in order to have comprehensive breed comparisons other measures such as growth rate, feed conversion efficiency and carcass and slaughter weight are of important parameters to be taken into consideration, which needs for further studies.

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