In this study, the performances of Holstein and Brown Swiss male cattle kept in a 12-month intensive beef system under the Mediterranean climatic conditions were compared in order to make recommendations for the beef producers in the region. The experiment was conducted in Isparta province located in the wet Mediterranean part of Turkey. For this purpose, 20 Holstein and 20 Brown Swiss male cattle with an average age of 6 months were assigned to two feedlot paddocks evenly and fed on the similar ration for 12 months in 2012. The average initial weights of Holstein and Brown Swiss breed animals were 158 and 132 kg respectively. General Linear Model (GLM) procedure was used for the statistical analysis of the data and initial weight and age were taken as covariates to eliminate the weight differences at the start of the experiment. It was found that at the end of the experiment, the differences in final weights were not statistically significant (P>0.05) and Holstein and Brown Swiss animals reached average final weights of 502 and 493 kg, respectively. Furthermore, there were no significant (P>0.05) differences in mean total gains (344 vs. 361 kg) and average daily live weight gains (0.985 vs. 1.028 kg). The results indicated that under the Mediterranean climate conditions both breed animals performed similarly and there was no superiority of any breed over the other although Brown Swiss cattle tended to show better performances. Therefore, both breeds can be recommended to be kept in a 12-month feedlot beef system for the beef producers in the region.

Key words: Holstein, Brown Swiss, beef cattle, Mediterranean, performance

Abbreviations: GLM – General Linear Model; IW – Initial weight; FW – Final weight; TWG – Total weight gain; DLWG – Daily Liveweight gain

Introduction

Conventional animal production is very diversified; dependent on climate and soil, and very much linked to the availability of local resources for plant growth or the animal breeds reared. In addition, it is also linked to the socio-economic conditions such as environment, the land tenure situation, quality of life and a reasonable degree of advanced technology. The animal production based on extensive systems have common features such as limited number of animals per unit land, relatively limited use of advanced technology, low productivity per animal and hectare of land, feeding mainly based on natural grazing (Boyazoglu and Nardone, 2003).

Beef production constitutes an important part of the agricultural sector of many countries. The development of beef industry in many countries 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).

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.

For the last decade, beef producers in Turkey have been facing a big challenge in meeting the great demand for red meat...
of the population along with its rapid growth rate. Therefore, feedlot beef production systems have gained a big interest due to its low investment and operational costs (Ecevit, 1999).

There is little or no concrete information on the comparative feedlot performance of Holstein cattle breeds with Brown Swiss cattle especially under the Mediterranean climatic conditions. Therefore, this study aimed to provide some information performance comparisons of breeds grown on a 12-month feedlot system in the Mediterranean part of the country.

Materials and Methods

Animals

The experiment was conducted at the Süleyman Demirel University Research Farm and composed of a total of 40 beef animals approximately six months old and with a mean initial weight of 145 kg; including 20 Holstein and 20 Brown Swiss. The initial average weights of the cattle were 132 and 158 kg for Brown Swiss and Holstein, respectively. All specimens were approximately 6 to 8 months old and were obtained from local cattle markets.

Animal Management

Animals were approximately six months old and were initially weighed at the beginning of the experiment and were divided according to their weights into two groups, each group having the same type of breed and were kept in feedlots with two pens. Each group was weighed and monitored on a fortnightly basis, using electronic weighing scale (True-Test2000 SmartUnit).

The experiment lasted for 12 months. Free access of the experimental animals to water was available throughout the experimental period.

Diets

Dried alfalfa and hay as roughages and ground barley and cattle fattening feed as concentrates were provided to obtain a target DLWG of 1 kg/day and designed according to live weight increases of the animals.

The rations were weighed out into bags and fed twice daily. Chemical compositions of concentrate diets are shown in Table 1.

Statistical Analysis

The data for breed types and seasons were analyzed by GLM procedure (Minitab v.16), using the following model:

\[ Y_{ijk} = \mu + \alpha_i + \beta_j + \varepsilon_{ijk} \]

Where \( Y_{ijk} \) is the \( ijk \) th observation of animal weight, \( \mu \) is the overall mean, \( \alpha_i \) is the effect of breed type, \( \beta_j \) is the effect of initial weight and, \( \varepsilon_{ijk} \) is the residual effect or random error associated with the individual animal.

Breed type factor was fitted as fixed effect, and initial weight was included in the model as a covariate (average 145 kg approximately).

Results and Discussion

There were some health problems encountered during the winter and one Holstein died of pneumonia and was dismissed from the statistical analysis.

The least-square means and standard errors for live weights for breed types are shown in Table 2.

There were no significant (P > 0.05) differences between breed types in FW, TWG and DLWG. Holstein cattle per-

Table 1
Chemical composition of concentrate diets

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter, %</td>
<td>88</td>
</tr>
<tr>
<td>Crude Protein, %</td>
<td>14</td>
</tr>
<tr>
<td>Crude Fibre, %</td>
<td>14</td>
</tr>
<tr>
<td>Crude Ash, %</td>
<td>9</td>
</tr>
<tr>
<td>Calcium, %</td>
<td>1.0-2.0</td>
</tr>
<tr>
<td>Phosphate, %</td>
<td>0.5</td>
</tr>
<tr>
<td>Sodium, %</td>
<td>0.3-0.6</td>
</tr>
<tr>
<td>Metabolic Energy, Kcal/kg</td>
<td>2600</td>
</tr>
<tr>
<td>Vitamine A, I.U/kg</td>
<td>5000</td>
</tr>
<tr>
<td>Vitamine D3, I.U/kg</td>
<td>700</td>
</tr>
<tr>
<td>Vitamine E, Mg/Kg</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 2
Overall performance comparisons of breed types**

<table>
<thead>
<tr>
<th>Breed Type</th>
<th>N</th>
<th>IW, kg</th>
<th>s.e.</th>
<th>FW, kg</th>
<th>s.e.</th>
<th>TWG, kg</th>
<th>s.e.</th>
<th>DLWG, kg</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein</td>
<td>19</td>
<td>158</td>
<td>4.92</td>
<td>502</td>
<td>6.16</td>
<td>344</td>
<td>5.12</td>
<td>0.985</td>
<td>0.023</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>20</td>
<td>132</td>
<td>4.52</td>
<td>493</td>
<td>6.67</td>
<td>361</td>
<td>8.05</td>
<td>1.028</td>
<td>0.028</td>
</tr>
</tbody>
</table>

** The means with the same superscripts within the same columns are not statistically significant (P > 0.05).
formed better than Brown-Swiss cattle in all parameters observed. Mean daily live weight gains for Holstein and Brown-Swiss cattle were 0.985 and 1.028 kg respectively.

Final weights and overall weight gains of Holsteins (502 kg and 344 kg respectively) were no statistically higher (P>0.05) than those of Brown Swiss cattle (493 kg and 361 kg respectively).

Wilkinson (1985) pointed out that conformation and growth potential vary greatly between different breeds of cattle. While there are certain 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, provided that each breed is fed and managed according to its own particular requirements.

Bozkurt (2006; 2007; 2011) reported about the superior weights of Holstein cattle. However, in this study the results were not in agreement with the results reported by Wilkinson (1985), Bozkurt and Ap Dewi (1996) and Bozkurt (2012). The results of this study showed that under the Mediterranean conditions Holstein and Brown Swiss cattle performed similarly and both can be well-suited to the feedlot beef systems.

However, as Keane et al. (1989) and Keane and More O’Ferrall (1992) reported that the results of these comparisons, including those reported in this study are not necessarily applicable outside the countries where comparison studies were carried out due to the differences in factors such as production systems, slaughter weights and climate, etc.

Conclusion

The results showed that under the Mediterranean climate conditions both breed animals performed similarly and there was no superiority of any breed over the other although Brown Swiss cattle tended to show better performances. Therefore, both breeds can be recommended to be kept in a 12-month feedlot beef system for the beef producers in the region.

Acknowledgments

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