Farmers living in Eastern Turkey mainly earn their incomes from livestock production due to the suitable environmental and climatic conditions in the region. Pastures in this area are abundant and relatively fertile. Also, there are many mountains and high plains which have approximately 1500-2000 meters elevation from sea level. In Eastern Turkey, climatic conditions are generally severe during the winter. Temperatures drop below zero centigrade during the winter and early spring.

On a dairy farm, calf raising is one of the regular jobs that has to be accomplished as economically as possible. In Turkey, milk is more expensive than calf starters when one looks at the price of the dry matter of both feed materials. Dairy farmers in this region spend great amounts of their money in calf raising because the calves are fed excessive amounts of milk for approximately 4-6 months. The calves need to be weaned as early as possible. Some studies in the region have been carried out regarding early weaning of he calves.\textsuperscript{11,12,13} However, additional research on this subject would be necessary to make an accurate assessment of early weaning under the cold climatic conditions of Eastern Turkey.

This study was undertaken to determine and to compare the growth characteristics of Brown Swiss calves weaned at 5 and 8 weeks of age.

**Early weaning of Brown Swiss calves raised in Eastern Turkey**

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In this study, seventy-one Brown Swiss calves born on the Research Farm of the Agricultural College at Atatürk University, Erzurum, Turkey were used. The calves, 35 male and 36 female, were allocated randomly to the weaning age groups (5 weeks and 8 weeks of age).

After the calves were born, they were allowed to suckle their dams and received colostrum for the first two days.

Then, whole milk was offered to the calves once a day (every morning).

The amount of milk given to the calves was 8% of their birth weight and this amount was kept constant during the milk feeding period.

Calf starter, dry hay in good quality and water were always available in the individual pens.

Two different kinds of the calf starter (starter I and starter II) were utilised in this project. The chemical composition of starter I was 20% crude protein, 5% ether extract, 5% crude ash and 9% crude cellulose.

After the calves reached 4 months of age, starter II was given to the calves. Starter II contained 18.5% crude protein, 4.5% ether extract, 10% crude ash and 11% crude cellulose.

The chemical composition of the dry hay consisted of 7% crude protein, 3% ether extract, 10% crude ash, 27% crude cellulose.

The body weights were determined and recorded at birth, weaning, 4 and 6 months of age of the calves. The experimental data were statistically analysed by using SAS statistics programme (SAS\textsuperscript{5}).

Results and discussion
The weights of Brown Swiss calves at birth, weaning, 4 and 6 months of age are presented in table 1. The average birth weights of the male and female calves were 36.4 and 34.4 kg respectively. The data concerning birth weight of Brown Swiss calves are in agreement with other findings.\textsuperscript{1,3,5,7} Although the male calves were heavier than the female calves, the differences in birth weights of the male and female calves were not statistically significant (P>0.05). The birth weights of the calves assigned for different weaning age groups were, also, not found to be significant (P>0.05), since the calves used in this research were randomly distributed to these treatments. The weaning weights of Brown Swiss calves raised in the east region of Turkey were significantly influenced by the weaning age treatments (P<0.01) as expected. Similar results have also been reported by\textsuperscript{8,9,10,14,15} In the present study, the average weaning weight of the calves weaned at 5 and 8 weeks of age were 42.4 and 54.5 kg respectively (table 1). However, the weaning weights of calves were not significantly affected by sex (P>0.05). The average weaning weights of the male and female calves were 49.8 and 47.1 kg respectively.

The average 4 months of age weights of calves were not significantly influenced (P>0.05) by different weaning age treatments. The findings are in agreement with previous results.\textsuperscript{14} The 4 months of age weights of calves in the 5 and 8 weeks of weaning age groups were 84.6 and 81.9 kg respectively. The weights at 4 months were also not significantly influenced by sex (P>0.05). The average weights of male and female calves at 4 months of age were 82.8 and 83.7 kg respectively (table 1).

The weaning age treatment did not have any significant effect (P>0.05) on the weights at 6 months of age. The result is in accordance with other findings.\textsuperscript{8,14} The average 6 months of age weights of the calves weaned at 5 and 8 weeks of age were 106.7 and 112.8 kg respectively.

Average daily total weight gains of the calves between birth and 6 months of age are presented in table 1. The daily and total weight gains of the calves were not significantly influenced by weaning age (P>0.05). The results are in accordance with other findings.\textsuperscript{5,10,12} Between birth

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**Table 1: The Weights, Weight Gains and Milk Consumption of Brown Swiss Calves**

<table>
<thead>
<tr>
<th>Weaning Ages (Weeks)</th>
<th>S</th>
<th>Male</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X=5.5 ± 0.77</td>
<td>36.4 ± 0.74</td>
<td>NS</td>
<td>36.4 ± 0.76</td>
</tr>
<tr>
<td>X=5.3 ± 1.25</td>
<td>64.5 ± 1.20</td>
<td>**</td>
<td>49.8 ± 1.23</td>
</tr>
<tr>
<td>4 Month</td>
<td>82.6 ± 2.00</td>
<td>NS</td>
<td>82.6 ± 2.00</td>
</tr>
<tr>
<td>6 Month</td>
<td>106.7 ± 2.73</td>
<td>NS</td>
<td>109.9 ± 2.69</td>
</tr>
</tbody>
</table>

**Significance**

- **S**: Significance
- NS: Non-Significant
- X=S: Mean ± Standard error of mean

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and 6 months of age, the daily weight gains of Brown Swiss calves weaned at 3 and 8 weeks of age were 0.400 and 0.424 kg respectively. In the same time period, total weight gains of the calves fed milk for 5 and 8 weeks were 72.0 and 74.7 kg respectively.

The milk consumption of the calves were significantly affected (P<0.01) by the weaning age treatments as expected. The amount of milk used for the calves during 5 and 8 weeks before weaning were 88.6 and 154.5 kg respectively (table 1).

Conclusion
The results of this research suggest that it is possible to wean Brown Swiss calves raised in the harsh environmental conditions of the east region of Turkey at 5 weeks of age without any detrimental effect on their growth. However, in this subject, other studies have to be carried out to investigate the possibility of decreasing the weaning age further.

REFERENCES