THE EFFECT OF MATERNAL AGE ON SOME BODY MEASUREMENTS IN ANATOLIAN BLACK CALVES

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Abstract

Birth weight is one of the most important parameters affecting the growth, improvement and yield of the calves in cattle breeding. The aim of this study is to research the effect of maternal age, gender of calf and birth year on some body measurements such as rump height, body length, chest girth, front wrist girth, rump breadth, chest breadth, chest depth and birth weight of calves of Anatolian Black Cattle which is one of the domestic cattle breeds with the widest living range in Turkey. In this study, some body measurements of 58 Anatolian Black calves borned between the year 2015-2017 in the herd of protection of genetic resources at Lalahan International Center for Livestock Research And Training were evaluated. The effect of maternal age was found statistically significant (p<0.05) only on chest girth, while the effect of gender was found significant on chest girth, front wrist girth and birth weight. The effect of birth year was not found statistically significant on all body measurements examined in this study. However, when maternal age is divided into two groups as group one (under 5 year age) and group two (over and equal 5 year age) the effect of maternal age was found significant (p<0.05) on chest girth, front wrist girth and birth weight in female calves and significant (p<0.05) on body length, chest girth and birth weight in male calves.

Keywords: Anatolian black cattle, Birth weight, Maternal age, Body measurements

In cattle breeding, as a measure of growth and development, various body measurements are taken as basis. The most important of these parameters is birth weight. Birth weight is an important factor affecting postnatal growth and development and progeny, milk and meat yield at later ages. Therefore, it is also of great importance in economic terms. Other body measurements are also factors that are effective except Birth Weight (Akbulut et al., 2001; Bilgic and Alic 2004; Karabulut et al., 2012; Wu et al., 2004).

There are several factors that have effect on the birth weight and body measurements of a calf. These are discussed in two main groups as genetic and environmental factors. While Genetic factors can be listed as breed and sex, environmental factors can be listed as maternal age, birthing season, gestation, maternal weight, number of offspring in the birth, and care-nutrition. Maternal age is one of the important factors that has effect on growth in the calves (Arpach, 1982; Souza et al., 1994; Kaygısız, 1998; Tepeli, 2014) reported that the effect of maternal age on birth weight, chest girth and Withers Height was not significant. Kılıçel and Tepeli (2008) found that the effect of parity on Withers height was not statistically significant (\(p<0.05\)). Also it is reported that the effect of parity on body length, chest girth, front wrist girth, rump breadth, chest breadth, chest depth and birth weight of Anatolian Black calves and the data of maternal age were examined. Parameters belonging to calves were taken within 24 hours after birth. For data of the maternal age, the Herd Registration Book at the Cattle Breeding Department was utilized. The birth weights of the calves were measured by an electronic scale sensitive to 200 g, other body measurements were measured by measuring stick and tape measure. They were all measured by the same technical personnel.

Measurements obtained in the study and basic statistical values of the maternal age were determined. Variance analysis of the measurement parameters was done. The relationship between body measurements and maternal age, gender of calf and birth year was determined by "Pearson Correlation". Statistical calculations were done with "Minitab 16" package program.

2. Materials and Methods

In this study, the data belonging to the herd of Anatolian Black Cattle created within the scope of Genetic Resources Conservation Project at the Directorate of Lalahan International Center for Livestock Research and Training were used. A total of 58 Anatolian black calves born during the period of 2015-2017 were evaluated in the study. Body measurements such as withers height, rump height, body length, chest girth, front wrist girth, rump breadth, chest breadth, chest depth and birth weight of Anatolian Black calves and the data of maternal age were examined.

In several researches which Brown Swiss cattle was used, it was reported that the effect of maternal age on birth weight was statistically significant (\(p<0.05\)) (Villalba et al., 2000; Kaygısız, 1998; Akbulut et al., 2001). Demirhan and Tekerli (2008) found it statistically significant that the effect of parity on birth weight \((p<0.05)\) and withers height \((p<0.01)\) in the study of Anatolian Black Cattle.

In this study, the effects of maternal age, gender of calf and birth year on withers height, rump height, body length, chest girth, front wrist girth, rump breadth, chest breadth, chest depth and birth weight of calves were evaluated in Anatolian Black Cattle in the herd of conservation of genetic resources at the Lalahan International Center for Conservation Project at the Directorate of Lalahan International Center for Livestock Research and Training.

3. Results and Discussion

The mean values of body measurements of calves according to the gender are given in Table 1.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gender</th>
<th>n</th>
<th>Withers Height (Cm)</th>
<th>Bump Height (Cm)</th>
<th>Body Length (Cm)</th>
<th>Chest Girth (Cm)</th>
<th>Front Wrist Girth (Cm)</th>
<th>Rump Breadth (Cm)</th>
<th>Chest Breadth (Cm)</th>
<th>Chest Depth (Cm)</th>
<th>Birth Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Female</td>
<td>8</td>
<td>60.91±1.094</td>
<td>15.74±0.172</td>
<td>52.63±1.955</td>
<td>52.63±1.955</td>
<td>54.03±1.313</td>
<td>54.03±1.313</td>
<td>54.03±1.313</td>
<td>54.03±1.313</td>
<td>18.94±0.826</td>
</tr>
<tr>
<td>2015</td>
<td>Male</td>
<td>9</td>
<td>61.11±0.110</td>
<td>15.89±0.715</td>
<td>52.83±1.834</td>
<td>52.83±1.834</td>
<td>54.03±1.313</td>
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<td>54.03±1.313</td>
<td>54.03±1.313</td>
<td>18.94±0.826</td>
</tr>
<tr>
<td>2016</td>
<td>Female</td>
<td>8</td>
<td>60.04±0.987</td>
<td>15.74±0.172</td>
<td>52.83±1.834</td>
<td>52.83±1.834</td>
<td>54.03±1.313</td>
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<td>54.03±1.313</td>
<td>18.94±0.826</td>
</tr>
</tbody>
</table>

The significance rating according to the least squares method of maternal age, birth year and gender factors of body measurements in Anatolian Black calves are given in Table 2. In the results of variance analysis performed on these data, it was determined that the effect of maternal age was found statistically significant \((p<0.05)\) only on chest girth but the effect of gender was found significant on chest girth, front wrist girth and birth weight.

In studies conducted with the same breed, Demirhan and Tekerli (2008) found that the effect of parity on Withers Height and Front Wrist Girth was very significant \((p<0.01)\), on birth weight was significant \((p<0.05)\) and on body length and chest girth was not significant. Kılıçel and Tepeli (2014) reported that the effect of maternal age on birth weight, chest girth and Withers Height was statistically significant \((p<0.05)\) in cows that gave two or more birth.

When compared with studies conducted in the same race Kılıçel and Tepeli (2014) found that the gender effect on birth weight, chest girth, body length and withers heights was not statistically significant. On the other hand Demirhan and Tekerli (2008) found that the gender effect on birth weight and front wrist girth was statistically significant \((p<0.05)\) while on chest girth, chest breadth, body length and withers height was not significant. Also it is reported that the birth weight of Anatolian black calves is higher than that of female calves (Anonymous 2004).

The effect of birth year was not found statistically significant on all body measurements examined in this study. However Demirhan and Tekerli (2008) reported...

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that the effect of birth year on birth weight and front wrist girth was statistically significant (p<0.05).

**Table 2.** The significance ratings (P Value) according to the least squares method of maternal age, birth year and gender factors of body measurements.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Withers Height (P value)</th>
<th>Rump Height (P value)</th>
<th>Body Length (P value)</th>
<th>Chest Girth (P value)</th>
<th>Front Wrist Girth (P value)</th>
<th>Rump Breadth (P value)</th>
<th>Chest Breadth (P value)</th>
<th>Chest Depth (P value)</th>
<th>Birth Weight (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age</td>
<td>0.286</td>
<td>0.390</td>
<td>0.341</td>
<td>0.034</td>
<td>0.880</td>
<td>0.553</td>
<td>0.224</td>
<td>0.512</td>
<td>0.074</td>
</tr>
<tr>
<td>Birth Year</td>
<td>0.500</td>
<td>0.308</td>
<td>0.113</td>
<td>0.478</td>
<td>1.00</td>
<td>0.994</td>
<td>0.066</td>
<td>0.540</td>
<td>0.965</td>
</tr>
<tr>
<td>Gender</td>
<td>0.217</td>
<td>0.120</td>
<td>0.256</td>
<td>0.045</td>
<td>0.00</td>
<td>0.622</td>
<td>0.992</td>
<td>0.620</td>
<td>0.004</td>
</tr>
</tbody>
</table>

In Table 3, the maternal age was assessed as a group of 4 years and under and a group of 5 years and over. According to the maternal age group, variance analysis was performed in terms of calf body measurements and birth weight parameters and for parameters where the difference between groups is important the significance level of differences was compared with Tukey multiple comparison test. As a result of analysis, it was determined that chest girth, front wrist girth and birth weight of female calves changed according to the maternal age (p<0.05). Similarly it was determined that body length, chest girth and birth weight values of male calves were affected by maternal age (p<0.05). As a result of the evaluation, it was determined that Anatolian Black cattle aged 5 years and over gave birth to bigger calves in terms of birth weight and chest girth characteristics.

**Table 3.** Variance analysis of some body measurements according to maternal age groups

<table>
<thead>
<tr>
<th>Gender</th>
<th>Maternal Age (year)</th>
<th>n</th>
<th>Withers Height (Cm)</th>
<th>Rump Height (Cm)</th>
<th>Body Length (Cm)</th>
<th>Chest Girth (Cm)</th>
<th>Front Wrist Girth (Cm)</th>
<th>Rump Breadth (Cm)</th>
<th>Chest Breadth (Cm)</th>
<th>Chest Depth (Cm)</th>
<th>Birth Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>≤4</td>
<td>10</td>
<td>56.90±0.966</td>
<td>60.60±0.816</td>
<td>58.20±1.446</td>
<td>56.63±1.165a</td>
<td>7.85±0.224a</td>
<td>9.60±0.233</td>
<td>13.35±0.460</td>
<td>18.90±0.722</td>
<td>15.20±0.485a</td>
</tr>
<tr>
<td>Female</td>
<td>≥5</td>
<td>15</td>
<td>58.27±0.032</td>
<td>62.07±0.932</td>
<td>53.72±1.329</td>
<td>61.27±1.041a</td>
<td>8.40±0.121a</td>
<td>9.53±0.124</td>
<td>13.83±1.319</td>
<td>20.37±0.703</td>
<td>18.60±0.744a</td>
</tr>
<tr>
<td>Male</td>
<td>≤4</td>
<td>17</td>
<td>58.71±0.629</td>
<td>63.32±0.707</td>
<td>51.44±1.258b</td>
<td>58.97±0.902b</td>
<td>8.79±0.149</td>
<td>9.65±0.205</td>
<td>13.59±0.258</td>
<td>19.74±0.489</td>
<td>18.18±0.617b</td>
</tr>
<tr>
<td>Male</td>
<td>≥5</td>
<td>16</td>
<td>60.56±1.057</td>
<td>65.13±1.133</td>
<td>56.03±1.659b</td>
<td>63.50±1.029b</td>
<td>9.11±0.131</td>
<td>10.99±0.104</td>
<td>14.31±0.302</td>
<td>20.72±0.516</td>
<td>21.71±0.912b</td>
</tr>
<tr>
<td>P</td>
<td>0.30</td>
<td>0.182</td>
<td>0.034</td>
<td>0.002</td>
<td>0.127</td>
<td>0.066</td>
<td>0.077</td>
<td>0.176</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Conclusions
As a result of the evaluation, it is thought that Anatolian Black Cattle have reached the maturity after 5 years of age and therefore give birth to bigger calves after reaching the maturity. The reason why the effect of birth year was not found statistically significant (p>0.05) on all body measurements examined is thought to be due to the fact that animals are standardized in terms of maintenance and feeding conditions in the Institute.

Conflict of Interest
The authors declare that there is no conflict of interest.

Acknowledgements
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