Histometric characteristics of different elements in the dermis of ovis

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ABSTRACT: The aim of this investigation was to study the histometric characteristics of different elements in the dermis of ovis. A total of twelve clinically healthy Iranian Lori-Bakhtiari sheep (aged 5-8 months) were selected and categorized on the basis of sex (6 of each sex). Samples were taken as small pieces from different regions of the skin, fixed and stained with haematoxylin and eosin. The determination of histometric characteristics of different elements in the dermis were carried out using light microscope and lattice line graticule (5*5). The Student t-test and one-way ANOVA were used to analyze the data and detect significant differences. Results showed that the histometric characteristics of studied different dermal structures varied between sexes and among the different body regions. Sex-related differences were found in the percentages of total follicles, blood vessels and connective tissues (P>0.05). Except for the connective tissue, the means of the other parameters in male were higher than females. This breed may be characterized by the total follicles percentages per mm² of 1.85-10.65, arrector pili muscles densities of 0±3.11, sweat glands percentages of 1.39-6.94, connective tissues percentages of 14.35-24.07, sebaceous glands densities of 0-1.85, and blood vessels percentages of 0-3.71 per mm² in this age. It can be concluded that the general histometric characteristics of different elements in the dermis of skin in Lori-Bakhtiari are similar to those of Bakhtiari sheep, but there are also some differences.

Key words: Histometry; Sex; Dermis; Ovis

INTRODUCTION

Skin that covers the body makes up 7-12% of the live weight. Besides its biological and immunological importance, it has an economic value as a raw material in industry (Özfiliz et al., 2002). It consists of two layers with different development and features: Epidermis and dermis (Dellmann, 1993). Epidermis consists mainly of a multilayer of keratinocytes (Junqueira and Camerio, 2003). Dermis which is a connective tissue that supports epidermis can be divided into a superficial papillary layer and a deep reticular layer (Dellmann, 1993; Kurtdede, 2002; Mobini, 2012b,c). One of the main Iranian fat-tailed and native breeds is Lori-Bakhtiari which found in West and Southwest of the country especially in Charamahal va Bakhtiari province where sheep production contributes significantly to the agricultural economy.

For the elucidation of histometric of different elements in the dermis of skin in ovis, some investigations have been carried out in different ovine species, such as the Bakhtiari (Mobini, 2012a,d; 2013a,b,c,d), madras red (Mir Shabir et al., 2011), Merino (Sumner and Craven, 2005; Warren et al., 2008), Omani (Mahgoub et al.,...
2010), Romney sheep (Sumner and Craven, 2005), native and hybrid (Özfiliz et al., 2002) and Tuj breed (Kocamıs and Aslan, 2004).

In spite of scattered histometrical investigations on the dermis by Mobini (2012a,d; 2013a,b,c,d), in Bakhtiari breed, no information is yet available on the histometric characteristics of different elements in the dermis of skin in Lori-Bakhtiari breed. The purpose of this study was therefore to describe the histometric characteristics of different elements in the dermis in this breed.

**MATERIALS AND METHODS**

A total of twelve clinically healthy Iranian Lori-Bakhtiari sheep of both sexes (6 females and 6 males), aged 5-8 months, were selected according to their phenotypic features in the abattoir of Shahrekord. Skin samples of each of 3 cm$^2$ were taken from eight regions namely belly, neck, leg, rump, flank, forearm, shoulder and hip. The samples of skins immediately fixed in neutral buffered formalin solution for 24 to 48 hours, cleared, and embedded in Paraplast. Transverse sections (6µ thick) were cut parallel to the surface of the skin at midsebaceous gland level and stained with haematoxylin and eosin (Kiernan, 2008). By using lattice line graticule (5*5), the following six parameters per one mm$^2$ were measured: sebaceous glands (Se), sweat glands (Sw), total hair follicles (F), blood vessels (Bv), connective tissues (Ct) and arrector pili muscles (Ar). Data were analyzed by Student t-test and one-way ANOVA, using the SPSS statistic software (version 20). All values were expressed as mean±standard deviation (SD). P<0.05 was considered as significant (Duncan's Multiple Range test).

**RESULTS AND DISCUSSION**

The histometric characteristics of studied different dermal structures in the various regions of skin in 5-8 months-old Lori-Bakhtiari sheep are shown in Table 1. These characteristics varied between sexes and among the various regions of skin.

Table 1. The percentages of different elements in the dermis per one mm$^2$ of skin in Lori-Bakhtiari, total follicles (F), sweat gland (Sw), sebaceous gland (Se), Arrector pili muscle (Ar), blood vessels (Bv) and connective tissue (Ct). Mean ± SD

<table>
<thead>
<tr>
<th>Region</th>
<th>Structures</th>
<th>F</th>
<th>Sw</th>
<th>Se</th>
<th>Ar</th>
<th>Bv</th>
<th>Ct</th>
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</thead>
<tbody>
<tr>
<td>M</td>
<td>3.24±1.60</td>
<td>5.09±4.88</td>
<td>0.93±0.60</td>
<td>0.0±0.0</td>
<td>0.93±0.80</td>
<td>23.15±5.62</td>
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</tr>
<tr>
<td>F</td>
<td>4.63±0.80</td>
<td>2.78±2.40</td>
<td>0.46±0.20</td>
<td>0.93±0.80</td>
<td>2.32±0.80</td>
<td>22.22±3.68</td>
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<tr>
<td>M</td>
<td>9.26±2.89</td>
<td>1.39±0.0</td>
<td>0.93±0.60</td>
<td>2.78±0.0</td>
<td>2.32±0.80</td>
<td>15.74±2.12</td>
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</tr>
<tr>
<td>F</td>
<td>10.18±3.21</td>
<td>3.70±2.89</td>
<td>0.46±0.20</td>
<td>0.93±0.60</td>
<td>2.78±1.39</td>
<td>15.28±1.39</td>
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<tr>
<td>M</td>
<td>7.87±2.12</td>
<td>3.24±0.80</td>
<td>0.93±0.80</td>
<td>2.32±2.12</td>
<td>3.71±0.80</td>
<td>15.28±6.05</td>
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</tr>
<tr>
<td>F</td>
<td>7.87±2.89</td>
<td>2.78±0.0</td>
<td>0.93±0.80</td>
<td>0.93±0.80</td>
<td>0.93±0.80</td>
<td>19.90±2.12</td>
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<td>2.78±1.39</td>
<td>16.20±3.49</td>
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<tr>
<td>F</td>
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<td>1.39±0.0</td>
<td>1.85±0.80</td>
<td>1.39±1.39</td>
<td>20.37±0.80</td>
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<tr>
<td>M</td>
<td>10.65±2.12</td>
<td>1.85±0.80</td>
<td>1.85±0.80</td>
<td>2.78±1.39</td>
<td>1.85±0.80</td>
<td>14.35±4.46</td>
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<tr>
<td>F</td>
<td>7.41±2.89</td>
<td>2.32±0.80</td>
<td>0.46±0.20</td>
<td>3.11±2.97</td>
<td>0.93±0.80</td>
<td>18.99±0.80</td>
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<tr>
<td>M</td>
<td>8.79±2.12</td>
<td>2.78±1.39</td>
<td>1.85±1.12</td>
<td>0.93±0.80</td>
<td>3.24±0.80</td>
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<tr>
<td>F</td>
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<td>1.85±1.38</td>
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<td>0.93±0.60</td>
<td>23.61±1.39</td>
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<tr>
<td>M</td>
<td>6.02±4.88</td>
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<td>0.46±0.20</td>
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<td>18.52±6.26</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>3.70±1.60</td>
<td>4.17±2.77</td>
<td>0.46±0.20</td>
<td>0.46±0.20</td>
<td>0.46±0.20</td>
<td>24.07±2.89</td>
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</tr>
<tr>
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<td>6.94±0.0</td>
<td>5.55±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>1.39±0.0</td>
<td>19.44±0.0</td>
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<tr>
<td>F</td>
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<td>5.09±4.01</td>
<td>0.0±0.0</td>
<td>1.39±0.0</td>
<td>0.93±0.80</td>
<td>19.44±5.01</td>
<td></td>
</tr>
</tbody>
</table>
Asterisks indicate significant differences between both sexes for a given body region (P<0.05).

There was evidence for sex-related differences in three parameters including of total follicles, blood vessels and connective tissues (P>0.05). With the exception of connective tissues, the means of the other parameters in male were higher than females.

The highest percentages of hair follicles and arrector pili muscles were found in flank skin (10.65±2.12 and 3.11±2.97), respectively. The lowest values of these parameters were recorded respectively, in forearm (1.85±1.60) and belly regions.

The mean total follicles percentages per mm² in the various skin regions was 1.85-10.65 in Lori-Bakhtiari sheep, while in Bakhtiari (Mobini, 2013d), Swedish Pelt sheep (Butler et al., 1993) and Merino and their hybrids (Andrews et al., 1998) the respective values were 4.17-11.80, 14-19 and 21.7.

The arrector pili percentages of various regions of skin in Bakhtiari were 0±3.24 (Mobini, 2013d). This value in Lori-Bakhtiari sheep were 0±3.11. In comparison of these results, indicated that the volume density of arrector pili muscle of skin in Lori-Bakhtiari sheep was very lesser than Bakhtiari breed.

Also, the highest percentages of sweat glands and connective tissues were found in shoulder skin (6.94±1.39 and 24.07±2.89, respectively). The lowest percentages of sweat glands were recorded in neck region (1.39±0.0) and connective tissues in flank skin (14.35±4.46). Mobini (2013d) in the Bakhtiari sheep, aged 3 years and more, reported that the maximum and minimum volume densities of sweat glands were recorded in belly (4.40±2.22) and rump skin (1.16±1.05), respectively (P<0.05).

In this study, the mean connective tissues percentages in various regions of skin were 14.35-24.07, while in Bakhtiari were 17.59-25.93 (Mobini, 2013d). Comparison of these results indicated that the percentages of connective tissues of skin in Lori-Bakhtiari sheep were lesser than Bakhtiari breed.

In this study, the mean density of sebaceous glands ranged between 0.1-0.85%. These values in Bakhtiari sheep were 0-2.78% (Mobini, 2013d). Warren et al. (2008) reported that the sebaceous gland area per unit length of flank skin in Merino ewes was 24.27±1.54.

The highest blood vessels density was recorded in leg region (3.71±0.80). The least this value was found in shoulder region. When the overall blood vessel density per one mm² of various regions of skin in Lori-Bakhtiari breed (0±3.71) were compared with those in Bakhtiari (0±2.78) (Mobini, 2013d), it was determined that values for the Lori-Bakhtiari sheep were higher than those for Bakhtiari.

It is concluded that the general histometric characteristics of different elements in the dermis of skin in Lori-Bakhtiari are similar to those of Bakhtiari sheep, but there are also some differences.

REFERENCES


