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ANALYSIS OF THE HAIR TEXTURE OF THE BOSNIAN BROKEN- HAISED HOUND – BARAK

SUMMARY

Bosnian broken-haired hound called Barak is the only broken-haired breed from the Balkans recognized by FCI, standard N°155 from 1973. The standard describes the hair of the Barak as long, hard, shaggy, tousled, with a dense undercoat. The basic colours of the hair is wheaten yellow, reddish yellow, earthy gray and dark gray. The colour can be combined in bicolour and tricolour. The standard does not define the length of the hair.

The Austrian Frank B. Laska (1905) conducted the first zootechnical examination on hounds from the territory of Bosnia and Herzegovina and classified them by the type of hair. Since 1905, the population of this breed in Bosnia and Herzegovina has not been the subject of research, its hair accordingly.

The aim of this paper was to collect samples and analyze the texture and quality of hair cover of Bosnian broken-haired hound – Barak. The study involved 30 dogs, including 22 males and 8 females, from the territory of Bosnia and Herzegovina.

The average length of hair was 7.03 cm for males and 6.67 cm for females, with large variation interval. Based on the results of covercoat hair, it can be concluded that this dog has coarse and hard hair, which completely justifies the very name of this breed (broken-haired). The results from this research can be used for further detailed description of this breed.

Keywords: Barak, hair texture, hound

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INTRODUCTION

According to today's official systematics accepted in cynology, the Fédération Cynologique Internationale (FCI, 2019) divide dogs into 10 groups, and the group of hound dogs is classified in group 6, which includes 3 sections (section 1 has 3 subsections) with total of 76 dog breeds:

FCI group 6	Scent hounds and related breeds
Section 1	Scent hounds
Section 2	Leash (scent) Hounds
<i>Subsection 1.1</i>	<i>Large-size Hounds</i>
<i>Subsection 1.2</i>	<i>Medium-size Hounds</i>
<i>Subsection 1.3</i>	<i>Small-size Hounds</i>
Section 3	Related breeds

(Fédération Cynologique Internationale – FCI, 2019)

The Austrian Frank B. Laska (1905) conducted the first zootechnical examination on hounds from the territory of today's Serbia and Bosnia and Herzegovina. The measurements were performed on 1036 hounds, and the results were published in the book *Das Waidwerk in Bosnien und der Hercegovina* (Laska B.F, 1905). According to the author, the Balkans are the nursery of hounds, that is, the hounds from the Balkans were the basis for creation many breeds of hounds on the West. Laska classified the hounds from these areas by the type of hair into:

1. Straight-haired (short-haired) hounds
2. Long-haired hounds
3. Broken-haired (rough-haired) hounds

For each group of hounds, the author gave detailed description in the form of standards. These are the first standards written for the hounds from the Balkans.

Bosnian broken-haired hound called Barak is the only broken-haired breed from the Balkans recognized by FCI and classified in group 6, section 1, subsection 1.2. The official Standard N°155 was adopted in 1973, and has not been changed since. The standard describes the hair of the Barak as long, hard, shaggy, tousled, with a dense undercoat. The basic colours of the hair is wheaten yellow, reddish yellow, earthy gray and dark gray. The colour can be combined in bicolour and tricolour. The standard does not define the length of the hair.

Since 1905, the population of this breed in Bosnia and Herzegovina has not been the subject of research, its hair accordingly. So, when it comes to hair cover of the Bosnian broken-haired hound called Barak, there are no references in

available literature that directly defines the texture and quality of the hair (Nikitović, 2020).

Besides, the lack of register of indigeneous breeds of domestic animals, with precise data on the species, locations and number of individuals, makes it impossible to take measures for protection as well as prevention of illegal exports, which endangers their survival (Nikitović et al, 2015).

The aim of this paper was to collect samples and analyze the texture and quality of hair cover of Bosnian broken-haired hound – Barak. We were not able to determine whether the obtained values meets the values defined by standard for this breed, as the standard only describes the look and the colour of hair, but gives no data on the length and diameter of the hair.

The hair texture of this broken-haired hound will give us information of how this dog adapted to harsh climate conditions of mountain forested regions of Bosnia and Herzegovina. They must have such a coat that allows them to stay out in the field for a long time in various weather conditions (Urošević et al, 2009). This research will also give us the insight of the justification of this breed's name itself.

MATERIAL AND METHODS

The research involved 30 dogs, including 22 males and 8 females, from the territory of Bosnia and Herzegovina. The analysis of the texture and quality of the hair was conducted using lanimeter manufactured by Reichert-Jung.

The samples were taken by cutting the strands of hair with scissors to the skin, from the left side of dog's body. Three strands of hair (one from the shoulders, one from the back and one from the croup) were taken from each dog involved in this research. There were more than 300 hairs in each strand of hair.

Three cross-sections with scissors were made on each of the samples. The first cross-section was made at the bottom, where the undercoat and cover hair are located. The second cross-section was made at the middle of the hair, and the third at the top, where the covercoat is located. After the sections were completed, each was placed on a microscope plate, one or two drops of glicerine was added, and covered with another plate. Counting of the hairs in each of the samples, as well as measurements of hair diameter were performed using lanimeter.

In order to obtain results of hair texture, the software *Statistical Package for the Social Sciences (SPSS) for Windows Release 17.0.0* was used to process collected data. Descriptive statistic values were calculated: coefficient of variation (CV), standard deviation (SD), minimum value (MIN), maximum value (MAX) and mean (\bar{x}).

RESULTS AND DISCUSSION

According to the exterior characteristics, the closest breed to Bosnian broken-haired hound Barak is Bulgarian long-haired hound Barak, though still not recognized by FCI. For the purpose of defining the exterior parameters of

Bulgarian Barak, a hair analysis was conducted on the sample of 20 male and 20 female individuals (Urošević *et al.* 2018). The authors state that the average diameter of cover hair was 21.59 μm (micrometer), while the undercoat hair had an average diameter of 12.89 μm . When it comes to separate regions, from where the samples were taken for examination of hair diameter, the results show that the largest diameter of cover hair was on shoulders (22.51 μm), and the smallest diameter was on the croup (21.12 μm). The authors state that a large variation interval was found for this parameter. Thus, the diameter of cover hair on shoulders varied from 5 μm to 70 μm . Variation interval for the cover hair diameter on the back had the range from 4 μm to 66 μm , while on the croup it varied from 3 μm to 66 μm . When it comes to undercoat, this study shows that the average value of undercoat hair diameter is 12.89 μm , with variation interval from 3.00 μm to 34.00 μm . The largest diameter of undercoat hair was found on the croup, with an average value of 14.00 μm , with variation interval from 3.00 μm to 30.00 μm . The smallest diameter of undercoat hair was found on the shoulders. The average value was 11.94 μm , with variation interval from 4.00 μm to 34.00 μm . Considering the values of the diameter of the covercoat hair, as well as the undercoat for Bulgarian hound Barak, it is obvious that this breed has coarse hair.

The hair of the Bosnian shepherd dog – Tornjak on the territory of Bosnia and Herzegovina was examined by Salkić *et al.* (2009). The study involved 42 dogs originated from two locations, Potocani (21 dog) and Imljani (21 dogs). The dogs lived on significantly different altitudes. On the lower altitude location (Potocani), the largest diameter of covercoat hair was found on the shoulders, with an average value of 65.68 μm , and variation interval from 56.03 μm to 72.25 μm . The smallest diameter of covercoat hair was found on the back, with an average value of 55.07 μm . Variation interval ranged from 47.02 μm to 59.46 μm . When it comes to the croup, the covercoat hair averaged at 58.28 μm , with variation interval from 49.72 μm to 62.46 μm . At the same observed location, a fairly homogenized diameter of the undercoat hair was found. On the shoulders, the average value was 25.67 μm , with a minimum of 22.97 μm and a maximum of 27.17 μm . On the back, the average value of the undercoat hair diameter was 25.54 μm , with variation interval from 22.27 μm to 28.53 μm . Speaking of the croup, the average value of the undercoat hair diameter was 25.78 μm , with a minimum value of 24.53 μm , and a maximum value of 27.06 μm .

On the other location (Imljani, mountain Vlastic), the average diameter of covercoat hair on the shoulders of Tornjak was 65.68 μm , with variations from 56.03 μm to 72.25 μm . The hair on the back and on the croup had smaller diameter. The average value of covercoat hair on the back was 55.07 μm , with minimum of 47,02 μm and maximum of 59.46 μm . The covercoat hair on the croup was 58.26 μm on average, with variation interval from 49.72 μm to 62.45 μm . When it comes to the diameter of undercoat hair on the shoulders, the average value was 25.67 μm , with minimum of 22.97 μm and maximum of 27.17 μm . The diameter of undercoat hair on the back averaged at 25.54 μm , with

variation interval from 22.27 μm to 28.53 μm . The average value of the undercoat hair on croup was 25.78 μm , a minimum was 24.53 μm , and a maximum was 27.06 μm .

There are only three dog breeds (Bulgarian long-haired hound - Barak, Bosnian and Hercegovinian-Croatian shepherd dog - Tornjak and Romanian shepherd dog - Mioritic), whose hair texture and quality was analyzed and described using this method, prior to this research.

The tables show the results for both males and females.

Table 1. Values of length and diameter of hair cover - males

Males (N=22)				
Parameter	$\bar{x} \pm \text{SD}$	Min	Max	CV
Hair length (cm)	7,03 \pm 1,65	4,00	11,00	23,55
Hair diameter – shoulder (μm)	14,13 \pm 7,05	4,00	51,00	49,94
Hair diameter – back (μm)	14,50 \pm 6,99	4,00	51,00	48,25
Hair diameter – croup (μm)	15,32 \pm 7,65	3,00	51,00	49,97

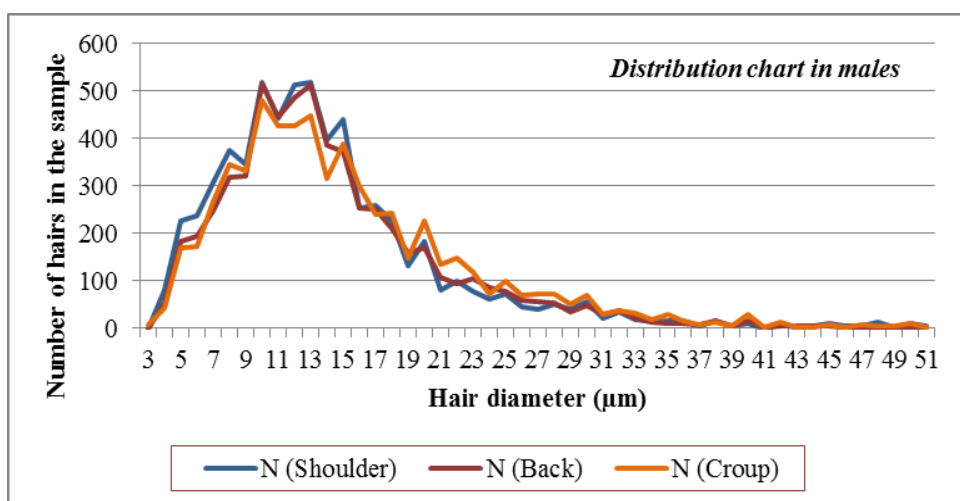


Chart 1: The diameter of hair - males

When it comes to the diameter of males' covercoat hair, the minimum diameter on the shoulders and the back was 4.00 μm (micrometer), while on the croup it was 3.00 μm . Maximum diameter of the hair was 51.00 μm . The average diameter of hair on the shoulders, the back and the croup in males was 14.13 μm , 14.50 μm , and 15.32 μm , respectively. The coefficient of variation is quite large in males, so for the shoulders it amounts 49.94%, for the back 48.25%, and for

the croup 49.97%. Standard deviation for the diameter of hair on the shoulders is 7.05, on the back 6.99, and on the croup 7.65. The hair cover in males had the largest diameter on the croup.

As shown on the above chart, the largest number of hairs in males had a diameter in the range between 4.00 μm and 21.00 μm from each body regions.

Table 2. Values of length and diameter of hair cover - females

Females (N=8)				
Parameter	$\bar{x} \pm \text{SD}$	Min	Max	CV
Hair length (cm)	6,67 \pm 1,23	4,00	10,00	18,47
Hair diameter – shoulder (μm)	14,71 \pm 7,04	3,00	49,00	47,92
Hair diameter – back (μm)	13,65 \pm 6,27	4,00	50,00	45,98
Hair diameter – croup (μm)	13,86 \pm 6,33	4,00	51,00	45,73

At female dogs, the hair on the shoulders had diameter of 14.71 μm on average, with standard deviation of 7.04. The corresponding values for the back amounted 13.65 μm with standard deviation of 6,27, and for the croup 13.86 μm with standard deviation of 6.33. The largest average diameter of hair in females was recorded on the shoulders.

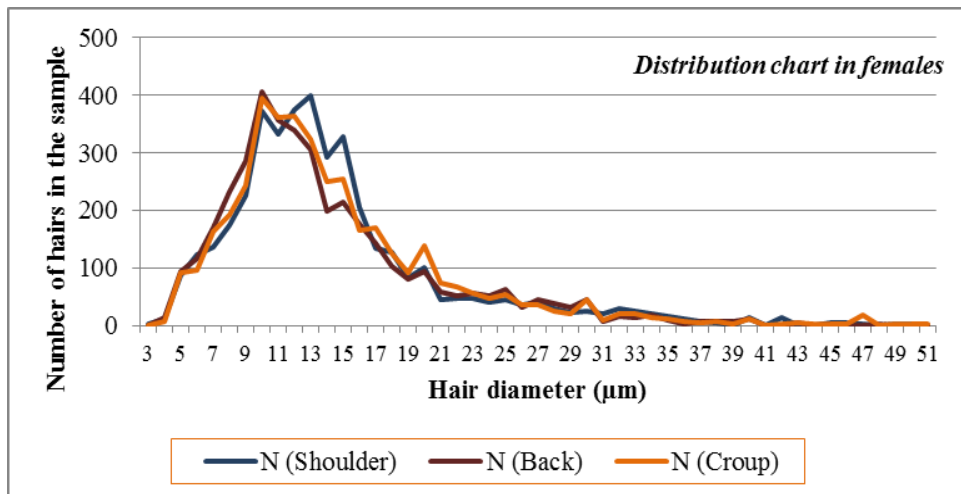


Chart 2. The diameter of hair - females

The standard describes the hair of the Barak as long, hard, shaggy, tousled, with a dense undercoat. Standard does not define the length of hair.

In the population of dogs that we examined, the average hair length was 7.03 cm in males, and in 6.67 cm in females. A quite large interval of variation is noticeable, as well as coefficient of variation itself, which is 23.55% in males, and 18.47% in females. When observing the diameter of hair cover, we have noticed that the males' hair has the largest diameter on the croup (14.13 μm), while the females has the largest hair diameter on the shoulders, and it amounts 14.71 μm .

Comparing to other hound breeds in the region, we have found that the most similar hair cover has the Bulgarian barak (Urošević et al, 2018). When it comes to hair of this breed, the research show that average diameter of hair is 12.89 μm , with variation interval from 3.00 μm to 34.00 μm . The hair had the largest diameter on the croup, with average value of 14.00 μm , and variation interval from 3.00 μm to 30.00 μm . The hair had the smallest diameter on the shoulders. The average value was 11.94 μm with variation interval from 4.00 μm to 34.00 μm . Considering the values of diameter of covercoat hair for the Bosnian barak and Bulgarian barak, it is obvious that both breeds of dogs has coarse and hard hair (Urošević et al, 2018).

CONCLUSIONS

Bearing in mind that Bosnian broken-haired hound Barak is indigenous breed, working in the field enabled us to found a decrease in number of dogs, which can be a huge problem when it comes to preserving this breed in the long term. In the population involved in this study, the average hair length in males was 7.03 cm, and in females 6.67 cm. We have also found the large variation interval in both males and females, as well as coefficient of variation.

Based on the results obtained from this research, primarily the values of covercoat hair diameter, it can be concluded that this dog has coarse and hard hair, which completely justifies the very name of this breed (broken-haired).

This is the first analysis of the hair texture for the Bosnian broken-haired hound Barak, and the results can be used for further detailed description of this breed.

REFERENCES

- FCI breed nomenclature (2019): <http://www.fci.be/en/nomenclature/6-Scent-hounds-and-related-breeds.html>
- Laska B.F. (1905): *Das Waidwerk in Bosnien und der Hercegovina*; Klagenfurt.
- Nikitović J. (2020): Fenotipska i genotipska karakterizacija bosanskog oštrodlakog goniča Baraka; Doktorska disertacija, Univerzitet u Banjoj Luci, Poljoprivredni fakultet
- Nikitović J, Sjeničić J, Đurić G. (2015): Analiza zakonske regulative u oblasti očuvanja genetičkih resursa Republike Srpske; *Agroznanje*, 16/5: (645-653)
- Salkić A, Šakić V, Urošević M, Stojić P. (2009): Prilog poznavanju finoće dlake tornjaka; Kinološki klub Tornjak, Travnik
- Urošević M, Drobnjak D, Hristozov G. (2018): Osobine dlake bugarskog goniča-baraka; 8. Naučni skup o lovstvu i lovnom turizmu, Žagubica. Zbornik radova, 60-64.
- Urošević, M., Matarugić, D. Savić, Đ. (2009): Osnovne osobine dlake karpatskog pastirskog psa. *Agroznanje*, vol. 10, 2:131-135.