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ARAŞTIRMA MAKALESİ **RESEARCH PAPER**

Morphometric Study on the Hasak Sheep Mandible

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Abstract: The study was carried out to reveal some macroanatomical and morphometric values on the Hasak sheep mandible. In the study, eight reformed dead Hasak sheep mandibles from Konya Bahri Dagdas International Agricultural Research Institute were used. The length between 19 different points in the mandible of Hasak sheep was measured and the values obtained were compared with other sheep breeds. As a result of this comparison, it has been determined that the mandible length and mandible height values of Hasak sheep are higher than Hemsin, Morkaraman, Tuj, Mehraban, Iranian domestic sheep breeds and lower than that of Konya merino sheep, Hasmer, Yankasa, Barbados Black Belly sheep. These results are of clinical importance to assist in regional anesthesia of the mandibular and mental nerves, especially during surgical operation, archaeological studies, tooth extraction and treatment in the mandible.

Keywords: Hasak sheep, mandibula, morphometric, nerve.

Hasak Koyunu Mandibula'sı Üzerinde Morfometrik Bir Çalışma

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Öz: Çalışma Hasak koyunu mandibulası üzerinde bazı makroanatomik ve morfometrik değerleri ortaya koymak amacıyla yapılmıştır. Çalışmada Konya Bahri Dağdaş Uluslararası Tarımsal Araştırma Enstitüsü'nden temin edilen 8 adet Hasak koyun mandibulası kullanıldı. Hasak koyununun mandibula'sında 19 farklı noktalar arası uzunluk ölçülmüş ve elde edilen değerler diğer koyun ırklarıyla karşılaştırılmıştır. Bu karşılaştırma sonucunda Hasak koyununun mandibula uzunluk ve mandibula yükseklik değerlerinin Hemşin, Morkaraman, Tuj, Mehraban ve İran yerli koyun ırklarından daha yüksek Konya merinosu, Hasmer, Yankasa ve Barbados Black Belly koyunlarındakinden ise daha düşük olduğu tespit edilmiştir. Bu sonuçlar, özellikle mandibula da yapılacak olan cerrahi operasyon, arkeolojik çalışmalar, diş çekimi ve tedavisi sırasında, mandibular ve mental sinirlerin bölgesel anestezisine yardımcı olacak klinik öneme sahiptir.

Anahtar kelimeler: Hasak koyunu, mandibula, morfometrik, sinir.

INTRODUCTION

In sheep, the mandible is important in terms of feeding, rumination and shredding thanks to its teeth. Among domestic mammals, sheep, the mandible consists of the horizontal corpus mandible and the vertical ramus mandible. Corpus mandibulae has two sides as margo ventralis and margo alveolaris. There are alveoli dentales for incisive, premolar and molar teeth on the corpus mandibulae and septa interalveolaria among them (Dursun, 1996; Özüdoğru et al., 2019b). The part where the corpus and ramus mandibulae meet in the mandible is called angulus mandible (Dursun, 1996; Özüdoğru et al., 2019b).

In order to increase meat production in our country, crossbreeding of some breeds of domestic sheep and domestic breeds is carried out. For this purpose, Hasak sheep race, which has the ability to reach more weight with less feed in a shorter time, was developed in Konya Bahri Dağdaş International Agricultural Research Institute. (Tekin et al., 2005). Hasak sheep is a high-yielding sheep breed with 31.25% Hampshire Down (HD), 31.25% German Black-headed Meat Sheep (ASB) and 37.5% Akkaraman genotype, which was formed as a result of crossbreeding studies started in 1989 at Konya Bahri Dagdas International Agricultural Research Institute. Sheep, which has a thin and long tail, does not have horns in males and females. For this breed, it was named HASAK by combining H letters from Hampshire Down (HD), AS from German Black Headed Meat Sheep (ASB) and AK from Akkaraman. (Kaymakcı & Taşkın, 2008).

Anatomical measurements of skulls have been carried out in roe deer, some goat and sheep breeds (Onuk et al., 2013). Macroanatomical and morphometric measurements of the mandible of sheep breeds were carried out both in medicine and Dentistry (Ünsal, 2016; Carvalho et al., 2018) and in Veterinary medicine (Yalçın et al., 2010; Karimi et al., 2011a; Avdic et al., 2013; Monfared, 2013; Demiraslan et al., 2014; Dalga et al., 2017; Özüdoğru et al., 2019a, b). However, no study was found on the morphometry of Hasak sheep's mandible.

The aim of our study is to reveal the macro-anatomical and morphometric properties of the Hasak sheep mandible structure.

MATERIAL AND METHOD

Animals and Experimental design: In the study, 8 reformed dead adult Hasak sheep mandibles obtained from Bahri Dağdaş Agricultural Research Institute were used. After the heads were separated from the body and the skin and flesh were cleaned, it was kept in hydrogen peroxide and the length between nineteen different points was measured in accordance with the literature (Driesch, 1976) by means of the Mitutoyo brand digital caliper. The average and standard deviation values of all measurements obtained after photographing the mandibula with the camera were determined.

Nomina Anatomica Veterinaria (ICVGAN, 2017) was based on the anatomical terms used. Nineteen different inter-point length parameters determined on the mandible in accordance with the literature (Driesch, 1976) are described below (Figure 1, 2, 3).

Measuring points. Condylion (Cnd); Processus condylaris caudal endpoint, (Coronion) Cr; Processus coronoideus caudal endpoint, Gonionventrale (Gv); The inferior end point of the Angulus mandible, Gonioncaudale (Gc); The caudal end point of the Angulus mandible, Infradentale (Id); The median point on the oral edge of the alveoli of the lower central incisive teeth (Figure 1).

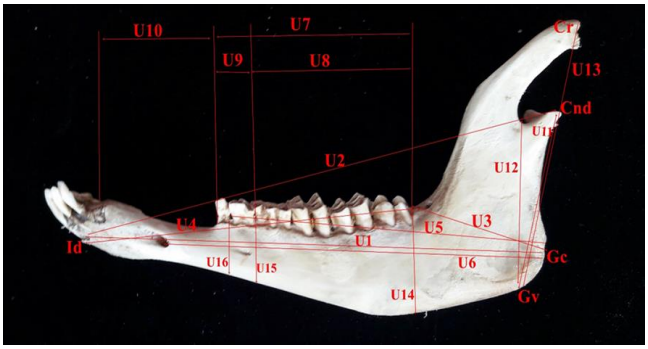

Figure 1. Measurement points on Hasak sheep mandible (U1: Length from Gc to Id, U2: Distance between the aboral edge of the Processus condylaris and the Id, U3: Length from Gc to the posterior alveolar edge of the 3rd molar tooth, U4: Length between the posterior alveolar edge of the molar tooth and Id, U5: Length between Gc and the anterior alveolar edge of the 2nd premolar tooth, U6: Length between Gc and the aboral edge of Foramen mentale, U7: Length between first premolar tooth and last molar tooth, U8: Length between first and last molar tooth, U9: Length between first and last premolar teeth, U10: Diastema length, U11: Length from Gv to Cnd, U12: Inc with Gv. length between the deepest point of the mandible, U13: Length from Gv to Cr, U14: Mandibular height at the level of the posterior alveolar edge of the 3rd molar tooth, U15: Mandibular height at the level of the anterior alveolar edge of the 1st molar tooth, U16: Height of the mandible at the level of the anterior alveolar edge of the 2nd premolar tooth).

Figure 2. Hasak sheep mandible medial view (U17: The distance between the Foramen mandible and the caudal end point of the Angulus mandible, U18: The distance between the foramen mandible and the base of the mandible, U19: Distance between the foramen mandible and the caudal edge of the mandible).

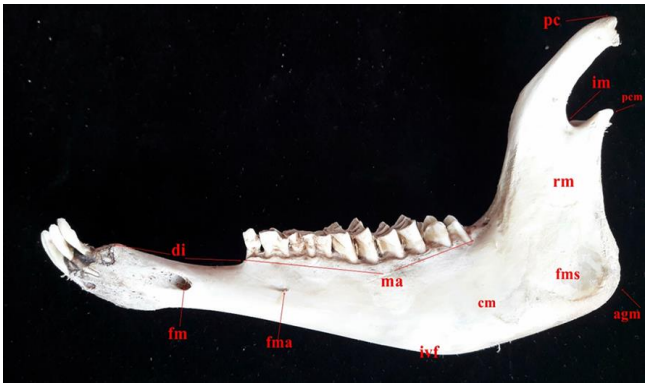

Figure 3. Hasak sheep mandible lateral view (di: Diastema, fm: Foramen mentale, ma: Margo alveolaris, ivf: Incisura vasorum facialium, cm: Corpus mandibulae, agm: Angulus mandibulae, fms: Fossa maseterica, rm: Ramus mandibulae, pcn: Processus condylaris, im: Incisura mandibulae, pc: Processus coronoideus, fma: Foramen mentale accessoria).

RESULTS AND DISCUSSION

The mean and standard deviation values of Hasak sheep's mandible in the study are shown in Table 1.

Table 1. Average and standard deviation values of mandible measurement values of Hasak sheep and other sheep (Konya merino (Özüdoğru et al., 2019a), Hasmer (Özüdoğru et al., 2019b), Hemşin (Dalga et al., 2017). Tuj (Demiraslan et al., 2014), Morkaraman (Demiraslan et al., 2014), Mehraban (Karimi et al., 2011), Barbados Black Belly (Mohamed et al., 2016), Yankasa (Shehu et al., 2019) and Iranian native sheep (Monfared, 2013) breeds.

	Hasak sheep	Konya merino	Hasmer sheep	Hemşin sheep	Yankasa sheep	Barbados Black belly sheep	Tuj sheep	Morkaraman sheep	Mehraban sheep	İran native sheep
U1	178.24±10.15	203.44±3.14	186.30±9.30	167.87 ± 17.11	198.0±0.28	181.7 ± 1.53	147.76 ± 5.40	152.43 ± 7.47	157.6±2.25	140.8 ± 0.01
U2	189,72± 12.24	211.30±2.00	200.11±10.55	176.95 ± 15.71			155.59 ± 5.28	160.43 ± 7.24		
U3	51.55±2.82	56.88±2.14	54.76±4.82	50.94 ± 6.81			43.61 ± 2.32	43.20 ± 4.56		
U4	124.27±7.15	132.89±1.37	127.51±2.92	121.76 ± 10.15			107.86 ± 4.04	112.81 ± 4.81		
U5	118.89±5.39	131.69±6.02	124.58±8.42	111.63 ± 12.71			102.94 ± 2.57	106.97 ± 6.24		
U6	146.57±8.83	163.44±3.65	149.40±11.02	137.87 ± 13.38	165.0±0.28	152.3±1.46	118.85 ± 2.52	122.29 ± 5.19	137.4±1.8	112.9 ± 0.47
U7	72.26±3.70	74.86±5.99	74.53±4.34	68.87 ± 5.78			66.14 ± 1.97	68.51 ± 2.70		
U8	48.75±3.29	54.64±3.28	49.26±3.11	57.2 ± 3.83			50.80 ± 1.85	53.12 ± 1.96		
U9	20.2±4.79	20.47±3.04	24.93±5.08	14.51 ± 0.96			14.94 ± 0.84	15.14 ± 0.90		
U10	43.67±5.47	52.51±3.90	43.54±3.48	43.74 ± 3.32			36.44 ± 2.5	37.16 ± 1.88	39.8±0.48	
U11	73.75±3.91	76.11±2.34	74.58±1.75	68.52 ± 4.68			60.86 ± 1.67	62.08 ± 4.13		
U12	68,68±4.96	73.00±3.05	69.63±2.69	62.02 ± 4.48			55.06 ± 2.26	57.19 ± 4.23		
U13	104.31±4.19	110.97±2.95	108.68±2.36	94.20 ± 7.65	129.0±0.57	152.5 ± 1.44	85.37 ± 2.74	86.97 ± 6.08	77.5±0.96	82.8 ± 0.48
U14	36,17±4.17	37.05±1.55	37.47±3.25	37.93 ± 1.84			36.86 ± 0.53	38.88 ± 1.81		
U15	22.33±1.59	21.39±2.02	23.81±1.70	21.65 ± 1.48			20.61 ± 0.64	21.18 ± 0.55		
U16	20.02±1.66	18.45±1.45	20.65±1.36	19.09 ± 1.33			15.89 ± 0.86	16.40 ± 0.88		
U17	26.95±2.79		30.20±1.26		40.5±0.07	34.1±0.25				28.2 ± 0.04
U18	32.15±2.95		34.19±1.54		54.5±0.07	37.5±0.22		41.4±0.47		29.9 ± 0.0
U19	22.42±2.73		23.63±2.55		24.0±0.28	23.0±0.25		17.4±0.33		13.2 ± 0.63

According to the values obtained in the study, although the mandible length and height values of Hasak sheep were higher than the Hemşin, Morkaraman, Tuj, Mehraban and Iranian sheep breeds, it was determined that the Konya merino (Özüdoğru et al., 2019a), Hasmer (Özüdoğru ve ark., 2019b), Yankasa (Shehu ve ark., 2019) and Barbados Black Belly (Mohamed ve ark., 2016), sheep were lower.

The length value (U6) between the caudal end point of the Angulus mandible and the aboral edge of the foramen mentale measured in Hasak sheep was found to be lower than the Konya merino (Özüdoğru et al., 2019a), Hasmer (Özüdoğru ve ark., 2019b), Barbados Black Belly (Mohamed ve ark., 2016), and Yankasa (Shehu ve ark., 2019) sheep. It was found to have a higher value than Tuj (Demiraslan ve ark., 2014), Morkaraman (Demiraslan ve ark., 2014), Hemşin (Dalga et al., 2017), Mehraban (Karimi ve ark., 2011) and Iranian native sheep (Monfared, 2013).

In the Hasak sheep, it was determined that the height of the mandible at the level of the front alveolar edge of the first molar tooth (U15) and the height of the mandible at the level of the front alveolar edge (U16) of the second premolar tooth (U16) was lower than that of Hasmer sheep only. According to this determination, the length of mandible in Konya merino, Hasmer, Yankasa and Barbados Black Belly sheep breeds reported in Table 1 is longer than the Hasak sheep, and the length between the mandible base and the arcus alveolaris is shorter. The distance between the foramen mandible and the base of the mandible.

The measured length of Hasak sheep between the Foramen mandible and the base of the mandible (U18) is lower than 32.15 ± 2.95, Hasmer (Özüdoğru et al., 2019b) 34.19 ± 1.54, Barbados Black Belly (Mohamed et al., 2016) (37.5 ± 0.22) and Yankasa sheep (Shehu et al., 2019) (54.5 ± 0.07) and higher than Iranian native sheep (Monfared, 2013) (29.9 ± 0.0).

The length between the caudal end point of the angulus mandible and the aboral edge of the foramen mentale (U6), Konya merino (Özüdoğru et al., 2019a) 163.44 ± 3.65, Hasmer (Özüdoğru et al., 2019b) 149.40 ± 11.02, Tuj (Demiraslan et al., 2014) 118.85 ± 2.52, Morkaraman (Demiraslan et al., 2014), Mehraban (Karimi et al., 2011) 137.40, Barbados Black Belly (Mohamed et al., 2016) 152.30, Yankasa (Shehu et al., 2019) 165.0 and Iranian native sheep (Monfared, 2013) as 112.90. In this study, this value was measured as 146.57 ± 8.83 in Hasak sheep.

In this study, it was determined that the height of the mandible at the level of the front alveolar edge of the first molar tooth (U15) and the height of the mandible at

the level of the front alveolar edge (U16) of the second premolar tooth (U16) was lower than that of Hasmer sheep only. According to this determination, the length of mandible in Konya merino, Hasmer, Yankasa and Barbados Black Belly sheep breeds reported in Table 1 is longer than the Hasak sheep.

CONCLUSION

The length between 19 different points was measured in the mandible of Hasak sheep and the values obtained were compared with other sheep breeds. As a result of this comparison, it was determined that the mandible length and height values of Hasak sheep were higher than the sheep breeds in the literature used in the study, such as the Konya merino, Hasmer, Yankasa and Barbados Black Belly sheep from the sheep breeds of Hemşin, Morkaraman, Tuj, Mehraban and Iran. In addition, in other comparisons, it has been determined that the mandible measurement values of Hasak sheep are higher than some sheep breeds, while it is lower than some sheep breeds.

These results are of clinical significance in terms of expertise in regional anesthesia of mandibular and mental nerves during surgical operations, tooth extraction and treatment in archaeological studies.

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