

Anatomical Study of the Tongue in Adult Rams

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Abstract:

The present study was designed to provide basic data about the anatomical features of the tongue in adult rams. The tongue was consisting from three parts: apex, body and root. The apex was nearly round with its rounded margin the apex increased gradually in width and thickness and then narrowest in the beginning of the body. The body was larger part of the tongue, begins narrow and then gradually increased in width and thickness until reach into beginning of root and then returns to narrowing. The root was last one and shorter part of tongue, which slopes ventrally and caudally toward the base of the epiglottis, and its width and thickness were nearly equal to the apex.

There were five different forms of lingual papillae of tongue of rams, the filiform, fungiform, conical, lenticular and circumvallate papillae distributed on the surfaces of the tongue.

The filiform papilla was soft horny threadlike structure inclined toward the posterior of the tongue. It was the smallest in size and most dominant from of pillae. The fungiform papilla was round, convex, mushroom-like papillae. The two forms of papillae were distributed on the dorsal and ventral surfaces of the apex and the body of tongue, with the decrease in number and increase in size when directed toward the body of tongue.

The conical papilla was conical in shape with several sizes (small, middle, and large) conical papillae, found rostral to the torus linguae. The lenticular papilla was convex lens in shape found in the middle part of torus linguae. The circumvallate papilla was round to oval in shape, surrounded by deep papillary groove and annular pad found on the lateral side to torus linguae arranged in two rows has, V, shape. The three forms papillae (conical, lenticular and circumvallate) were found on the dorsal surface of the caudal part of the body. The dorsal surface of the root of tongue was devoid from any papillae.

دراسة تشريحية للسان الخراف البالغة

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الخلاصة:

صُممت الدراسة الحالية لتزويد بيانات أساسية حول الميزات التشريحية للسان في ذكور الخراف البالغة. يتكون اللسان من ثلاثة أقسام: قمة وجسم وجذر. القمة كانت تقريبا مستديرةً وذات حافات مدورة، ازدادت القمة بشكل تدريجي في العرض والسُمك وبعد ذلك أصبحت ضيقة في بداية الجسم. الجسم يمثل أطول أجزاء اللسان يبدأ بالتضييق وبعد ذلك يتزايد بشكل تدريجي في العرض والسُمك حتى وصوله إلى بداية الجذر مرة أخرى ويصبح ضيق. يمثل الجذر آخر وأقصر أجزاء اللسان، ينحدر بطنياً و خلفياً نحو قاعدة لسان المزمار وله عرض وسُمك، مساوي تقريباً إلى قياس القمة. هنالك خمسة أنواع مختلفة للحليمات اللسانية وُجدت في لسان الخراف هي الحليمات الخيطية والفطرائية و العدسية والمخروطية والكاسية، موزعة على أسطح اللسان. الحليمات الخيطية لها شكلاً خيطياً مقرباً ناعماً وكانت اصغر الحليمات اللسانية حجماً والأكثر عدداً، مائل نحو مؤخرة اللسان؛ الحليمات الفطرائية لها شكلاً يشبه الفطر محدب ومستدير. الحليمات الخيطية والفطرائية وُزعتا على السطوح البطنية و الظهرية لكل من قمة وجسم اللسان، وكلما اتجهتا خلفياً قل عددهما و ازداد حجمهما. تمتاز الحليمات المخروطية بان لها شكلاً مخروطياً وابعام مختلفة تتراوح بين الصغيرة والمتوسطة والكبيرة. تتواجد الحليمات المخروطية أمامياً للمرتفع اللساني. الحليمات العدسية لها شكل يشبه حبة العدس المحدبة، تتواجد هذه الحليمات في الجزء الوسطي للمرتفع اللساني. الحليمات الكاسية لها شكل مدور إلى بيضوي محاطة بأخدود حلبي عميق و وسادة حلقيه، يتواجد هذا النوع من الحليمات جانبياً للمرتفع اللساني وتترتب في صفين على شكل حرف -V-. الحليمات الثلاثة الأخيرة تتواجد على السطح الظهري من الجزء الخلفي لجسم اللسان فقط، ويمتاز جذر اللسان بكونه لا يحتوي أي حليلة.

Introduction:

The digestive system consists of gamut from tubular organs, accessory gland, and additional structures (lips, teeth and tongue). The tongue regarded highly mobile muscular organ covered by mucous membrane, its play very important role in seizing food and bringing it to the mouth and subsequently help break it apart in concert with the teeth and formation of a food bolus

ready for swallowing and sensation with taste (1 and 2).

The lingual surface was characterized by large number projection called the lingual papillae which different in shape and size such as (filiform, fungiform and circumvallate) which found in all animals but lenticular papillae found only in ruminants (3 and 4). The tongue of ram has five types of lingual papillae which were dissemination on lingual surface: filiform papillae, conical papillae, lenticular papillae, fungiform

papillae and circumvallate papillae (5, 6 and 7).

Due to modicum of researches of the anatomical features and biometrical parameters deals with the anatomy of tongue in rams therefore this study was designed to provide basic data about the anatomical structures of the tongue, to prepare available basis for further studies.

Materials and methods:

Twenty samples of tongues adult rams were obtained from AL Diwanyh abattoir. The samples were collected immediately after animal slaughter and separation of heads from the carcasses at the level of atlanto-occipital joint (5). Each sample was washed with normal saline solution and kept in clean plastic container to perform the required measurement (8).

Dissecting of tongues and remove of the extrinsic muscles (styloglossal, hypoglossal and genioglossal) from the tongue were done and then used to study and record the morphological features and biometrical parameters by using vernier callipers, thread and a centimeter scale.

Results:

The tongue was consisting from three parts: apex, body and root (Figure. 1). The total length of the tongue in ram (19.77 ± 0.334) cm. The wider and thicker areas in the middle part of the apex was (3.33 ± 0.083), and (1.32 ± 0.097) cm

respectively, while the widest and thickest part of the body in the middle of the torus linguae was (3.91 ± 0.037), and (2.3 ± 0.059) cm respectively whereas in the root, the width was (3.17 ± 0.097) cm and thickness was (1.33 ± 0.053) cm in first part of root (Table 1).

The apex of the tongue was nearly rounded in shape which formed by meeting of the dorsal and the ventral surfaces, with rounded margin, shallow median longitudinal groove length (3.75 ± 0.260) cm notice on the dorsal surface of apex which across for short distance in ventral surface. The apex increased gradually in width, thickness and then narrowest in the beginning of the body (Table 1). The body was the largest and the longer part of the tongue located between the apex and root, it has four surfaces ventral, dorsal, two lateral surfaces. It has elliptical dorsal prominence, called torus linguae which limited rostrally by a shallow transverse depression called lingual fossa extended (1.77 ± 0.1125) cm.

The body begins narrow and gradually increased in width and thickness until reach to the beginning of root, then return narrow (Table 1). The root was the last and the shorter part of the tongue lies caudally to body of the tongue and slopes ventrally and caudally toward the base of the epiglottis. The width and thickness of the root nearly of that of apex (Table 1), while dorsal surface of root devoid from papillae.

Five types of lingual papillae were found they filiform, fungiform, conical, lenticular and circumvallate papillae (Figure 1).

The filiform papillae were soft horny threadlike structure, inclined toward the posterior of the tongue. It was the smallest in size and most dominant forms all lingual papillae. The papillae were densely pavement distributed on the dorsal and ventral surfaces of the apex and body of tongue; fungiform papillae were round, convex, mushroom-like papillae, little elevated from the lingual surface, distributed on the dorsal, ventral surfaces of the apical free part from the apex; dorsal, dorsolateral surfaces of the tongue body among the filiform papillae. Both the two papillae were decreased in number and increased in size when directed toward the body (Table 2).

The conical papillae were elongated, conical in shape and

which found in several sizes (small, middle, and large) conical papillae, observed caudal to the lingual fossa and continuous caudally on the dorsal and dorsolateral to the rostral part of torus linguae with decreased in number, while the lenticular papillae was the largest mechanical papillae, convex lens in shape, situated on the middle part of the torus linguae. It was few different in size.

The circumvallate papillae were round to oval in shape, with minute elevation from the lingual surface. It was situated on the dorsolateral surface of the caudal part from the torus linguae, arranged in two rows on both side of tongue in (V) shape. It was surrounded by deep papillary groove and annular pad, the outer row was more in number than inner row (Table 2). Various biometrical parameters pertaining the tongue of rams are presented in tables 1 and 2.

Table 1: Biometry of the tongue in ram. Number of animal = 20, Mean \pm SE

Length of tongue		Width of tongue		Thickness of tongue	
Total length	(19.77 \pm 0.334)cm	Width of apex	(3.33 \pm 0.083) cm	Thickness of apex	(1.32 \pm 0.097)cm
Length of apex	(5.13 \pm 0.134) cm	Width of body	(3.91 \pm 0.037) cm	Thickness of body	(2.3 \pm 0.059) cm
Length of body	(12.3 \pm 0.260) cm	Width of root	(3.17 \pm 0.097) cm	Thickness of root	(1.33 \pm 0.053)cm
Length of root	(2.34 \pm 0.222) cm				

Table 2: Density of fungiform and circumvallate papillae on the tongue in ram. Number of animal = 20, Mean \pm SE

Fungiform papillae.		Circumvallate papillae	
A-Total number in tongue.	(494.6 \pm 14.577)	A-Total number in right side.	18.3 \pm (1.044)
B- Total number in apex	(404.1 \pm 8.293)	Inner row.	7.9 \pm (0.604)
C- Total number in body.	(90.5 \pm 31.51)	Outer row.	10.4 \pm (0.805)
		B- Total number in left side.	20.8 \pm (1.404)
		Inner row.	8.4 \pm (0.763)
		Outer row.	12.4 \pm (1.107)



Figure 1: Tongue of ram shows the tongue parts and position of papillae.

A- Apex, B- Body, C- Conical papillae, D- Longitudinal groove,
 F- Lingual fossa, FI- Filiform papillae, FU- Fungiform papillae,
 L- Lenticular papillae, R- Root, T- Torus linguae, V- Circumvallate papillae.

Discussion:

The length of tongue in the present study (19.77 ± 0.334)cm was in disagreement with (8) who found, the length of sheep tongue was (14.15 ± 0.08)cm, while agreed with (9) who reported (20)cm length. This difference may attribute to the age and species studies animals.

The tongue of the ram was in variable pigmentation and its apex was nearly rounded with rounded margin and has shallow median longitudinal groove on the dorsal surface of apex, this result was nearly accordance to in sheep (5), in contrast in goat (10) mentioned that, the apex of the tongue was notched in the center and somewhat flattened. The apex of the tongue was free and pointed with blunt rounded margin in ox (3) and in buffalo (11 and 12). The difference related to the species of animal.

The present study revealed that the posterior area of the body tongue have prominent torus linguae like other grass eating artiodactylas which has a well developed lingual prominence on the dorsal surface (3, 5, 10, 12, 13, 14, 15, 16, and 17).

In this research the filiform papillae in sheep were densely pavement distributed on the dorsal and ventral surfaces of the apex, the height of papillae increased caudally toward the pharynx as reported in small ruminants (13), in buffalo (12). While present only on the dorsal surface in ox, buffalo, and horse (11, 13, and 18). In cattle (19) have been mentioned that the filiform papillae,

which found in apex is larger than that found on the body and the height of papillae increased toward the apex.

This study confirms that the arrangement of filiform papillae gave the tongue of sheep a rough surface assist to the movement of the food. The posterior directions of the papillae help to push the food toward the pharynx and this agreement with in domestic animals (11, 12, 13 and 20).

The results in this work showed that, the fungiform papillae were round, convex and mushroom-like papillae, scattered on the dorsum of tongue among the filiform papillae with minute elevation from the tongue, these results were in agreement with what mentioned in sheep (6, 7, 8, 9 and 21), in goat (10, 17, 22, and 23), in camel (23 and 24), in cow (25).

The total number of fungiform papillae (494.6 ± 14.577) in sheep, this finding is in disagreement with, in sheep (8) who mentioned that the total number of fungiform papillae (424.94 ± 6.30).

The present result were showed that, the conical papillae were located on torus linguae and large in size, this work similar to results by in domestic animals (13), in camel (26), in ox (27), buffalo, and camel; in buffalo (12, 28, and 29) while in pig (30) the papillae were distributed mainly on the lingual root.

Our results revealed that, tongue of ram has lenticular papillae was

convex lens in shape, which limited on the middle part of the torus linguae and this similar to results done by in sheep and goat (5, 6, 7, 13, 17, 18, and 31), in buffalo (12 and 29). In contrast it absence in horse, ox, buffalo, pig, and carnivores (3, 27, 32, and 33).

This finding suggested that, presence of conical and lenticular papillae probably related to the presence of the torus linguae in sheep when compare with carnivores, horse and pig. The conical and lenticular papillae have mechanical function where these papillae increased mastication efficiency, rub of food and facilitate movement of food inside the mouth cavity in domestic animal (20 and 34).

The present study appeared that, the circumvallate papillae were round to oval in shape, with minute elevation from lingual surface, surrounded by papillary groove and annular pad, it located on the caudal part from the torus linguae arranged in two row has "V" shape. This finding agreement with, in sheep (6 and 7), in goat (22).

The present study showed that, the tongue of sheep has (18.3 ± 1.044) circumvallate papillae on right side and (20.8 ± 1.404) papillae on left side. This disagreement with in sheep (9) referred that, the number of circumvallate papillae about (30) on both sides. While in ruminants such as cattle, sheep and goat possess (8-17), (18-24) and (12-18) papillae respectively (13).

The difference may be due to age and species of studies animals.

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