

## ANATOMICAL STUDY OF THE TONGUE OF INDIGENOUS COW (*BOS INDICUS*) IN BANGLADESH WITH SPECIAL EMPHASIS ON PAPILLAE DISTRIBUTION

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### ABSTRACT

The present study was conducted on the tongue of six apparently healthy indigenous (*Bos indicus*) cows of different age and sex and they were collected from local market at Dinajpur district and this research work was conducted in the Department of Anatomy and Histology, Dinajpur Government Veterinary College, Dinajpur during the research period from the month of July 2003 to April 2004. After proper euthanasia, the animals were killed and then the tongues of these animals were dissected out from the carcasses and fixed in 10% neutral buffered formalin solution. In the present study it was observed that the tongue of indigenous cow (*Bos indicus*) of Bangladesh has three parts: the root, body and an apex. The dorsum linguae was specially more pronounced in its centre and was occupied by numerous types of masticatory and gustatory papillae. The fine rasp-like filiform papillae were more numerous and directed caudally throughout the dorsum and packed closely in front of the fossa linguae throughout the tip, whereas, the club shaped fungi form papillae were irregularly distributed all over the dorsum among the filiform papillae. The broad headed lentil shaped lenticular papillae was also found in the rostral two-thirds of the dorsum but better developed along the mid-line of the tongue. The large conical papillae of the tongue of *Bos indicus* occurred in the rostral two-thirds of the dorsum with a higher concentration in the middle portion of the tongue, however, the small ones occurred through out the torus. The vallate papillae of the tongue of *Bos indicus* were 12-20 in number on either side and dispersed in two irregular rows (25-40) in total along the caudolateral two-thirds of the dorsum. The mucosa of the root of the tongue of *Bos indicus* did not show any specific papillae but it was rather smooth due to diffused lymphoid tissue distribution (lingual tonsil).

**Keywords:** Tongue, papillae, distribution, indigenous cow

### INTRODUCTION

The tongue is an important accessory digestive organ of cow and other animals. It is a prehensile organ during the presence of papillae and helps in taking food, mastication, swallowing and rumination. Tongue is exposed externally during prehension as a result it is a common site of lesions of many infectious and non-infectious diseases of cow. In this way the tongue is affected and can not functioning properly. As a result the cow can not take food as its required and become emaciated. Rumination is also hampered, and for these reason the cow can not produce proper quantity of milk. Although the structural studies on this important organ has done in Indian Gaddi goat, Assam goat, in Indian buffalo, yak and Black Bengal goat, but in particular have been found to be scarce in indigenous cow (*Bos indicus*) of Bangladesh as per available literature. Hence the present study was undertaken

### MATERIALS AND METHODS

The present study was conducted on the formalin fixed tongues that were collected from the six apparently healthy adult indigenous cows. The animals were free from diseases and were purchased from local markets at Dinajpur district near Dinajpur Government Veterinary College. After proper euthanasia, the animals were killed and the tongues were dissected out from the carcasses and were transected with the hyoid bone and then washed out with 0.9 % physiological normal saline to avoid food particles and other substances. Then the tongues were fixed in 10% neutral buffered formalin solution. Magnifying glass was used for observing and also for counting of different papillae of the tongues during the time of research work that was conducted in the Department of Anatomy and Histology, Dinajpur Government Veterinary College, Hajee Mohammad Danesh Science and Technology University from the month of July 2003 to April 2004.

### RESULTS AND DISCUSSION

The tongue of *Bos indicus* was consisting of root, body and apex. It was located on the floor of the mouth between the two horizontal rami of the mandible and it was limited rostrocaudally by the lingual surface of incisor teeth and by glosso-epiglottic fold and on either side by the mandibles. It lays over the myelohyoid muscle attached caudally to the ligal process of the hyoid bone and the rostral pillars of the soft palate. This observaton was similar to Gupta and Sharma (1991) in Indian yak and in ox by Raghavan (1964). On either side of the frenulum occurred 16-20 pointed curved papillae (from its rostral limit to the level of the third cheek tooth).

Ventrally the frenulum linguae fixed its caudal three-fourths leaving the rostral one-fourth free. The frenulum linguae extended from the root of the tongue to a point 4-5 cm caudal to the level of caruncula sublingualis and 3-4 cm rostral to the level of the first cheek tooth. The ratio between the free and fixed portions of the tongue was 1:3.4 to 1:4.1 which was similar to Gupta *et al.* (1989) in Indian buffalo. On the dorsal surface of the tongue, more pronounced dorsum linguae was limited rostrally by the fossa linguae in the middle of the tongue at the level of third cheek tooth. In contrast with this, in Indian buffalo, Gupta *et al.* (1989) observed that the fossa linguae limited the dorsum linguae in the middle of the tongue at the level of second cheek tooth. The whole dorsum linguae were occupied by numerous types of masticatory and gustatory papillae which was similar to Gupta and Sharma (1991) in Indian yak.

The quantitative data on the concentration of these different kinds of papillae in the different regions of the tongue are shown in Fig. 1. Since papillae filiformes were difficult to be counted their concentration has been shown as thinly (+) or moderately (++) and densely (+++) populated.

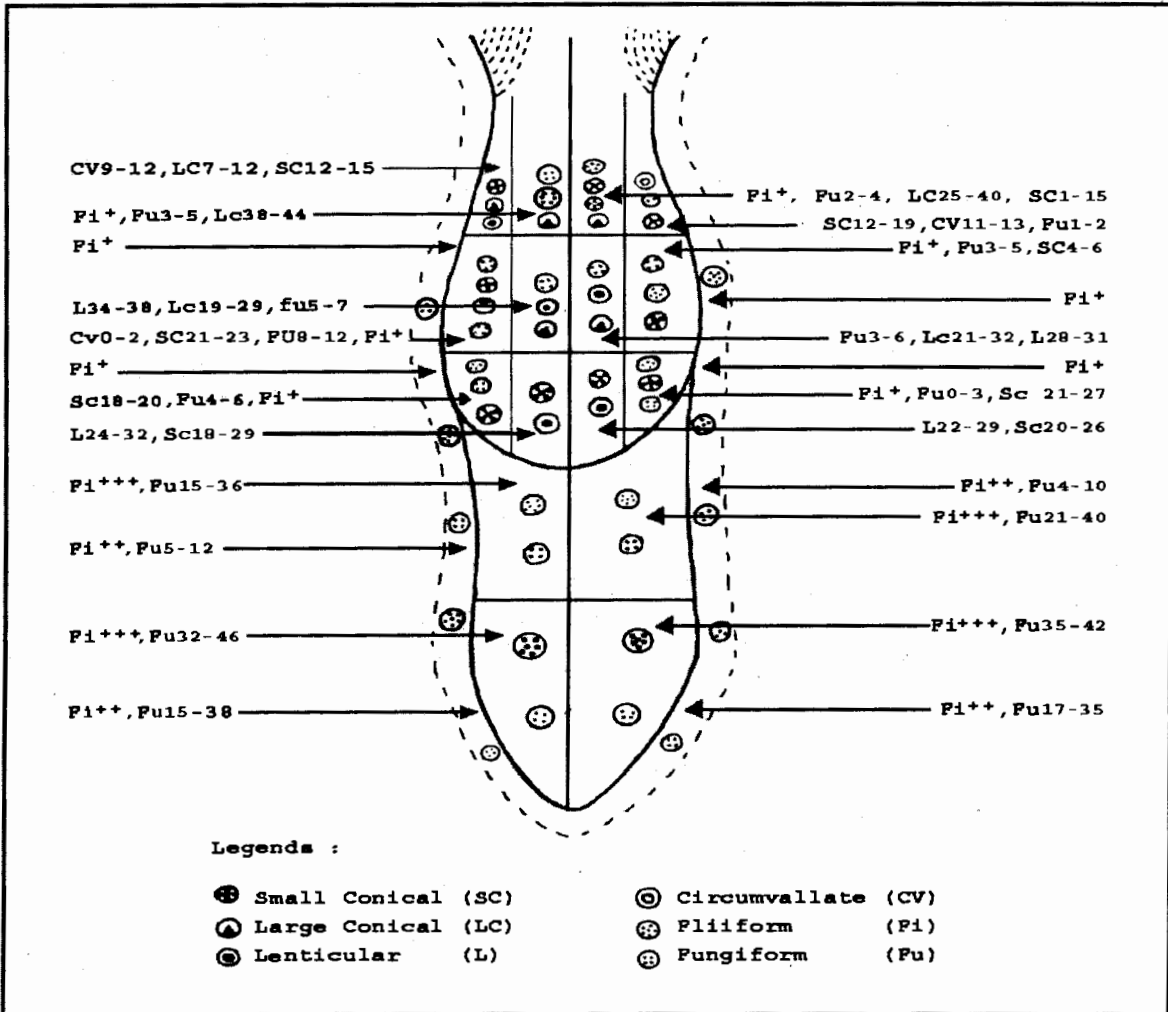


Fig. 1. Schematic diagram of the tongue of indigenous cow (*Bos indicus*) showing distribution pattern of various types of papillae. Dotted line along the periphery denotes the ventral and lateral margins of the tongue. The concentration of filiform papillae (Fi) has been indicated by +, as these could not be counted manually (Fi +, thinly populated; Fi ++, moderately populated; Fi+++ , very densely populated), LC = Large Conical Papillae, SC = Small Conical Papillae, L = Lenticular Papillae, FU = Fungiform Papillae, CV = Circum vallate Papillae.

The filiform papillae of *Bos indicus* were more numerous, fine rasp-like directed caudally throughout the dorsum and were closely packed in front of the fossa linguae but on the lateral aspect of the dorsum, lateral margins and caudal part of the tongue these were not so closely packed. The papillae at the apex linguae were, however, larger in size. This observation was similar with the Gupta and Sharma (1991) in Indian yak. On the other hand Dhingra and Barnwal (1979) described in Indian buffalo that the filiform papillae were extensively distributed over the dorsal surface and margins of the ventral surface of the tongue and the giant filiform papillae lay between the two arms of the 'V' of vallate papillae.

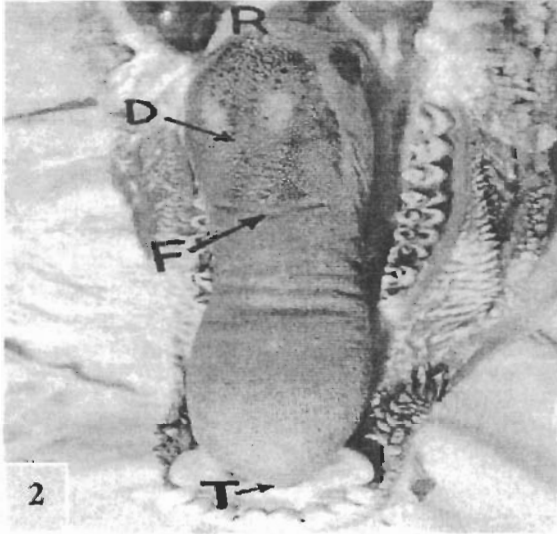


Fig. 2. Floor of the mouth with tongue in situ showing dorsum linguae (D), fossa linguae (F), root (R) and tip (T).

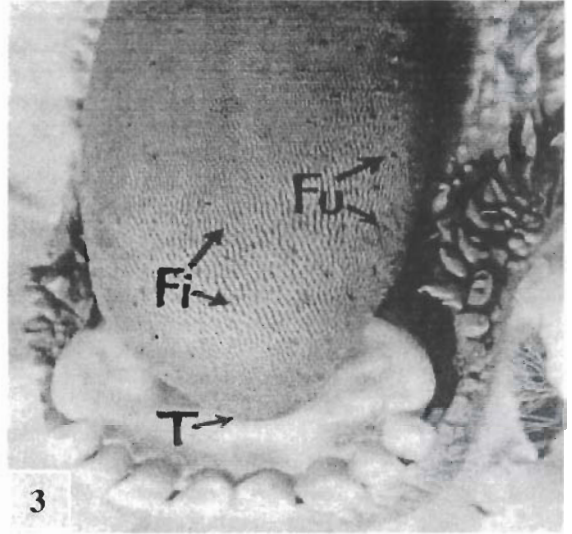


Fig. 3. Tip of the tongue showing filiform papillae (Fi) and fungiform papillae (Fu).

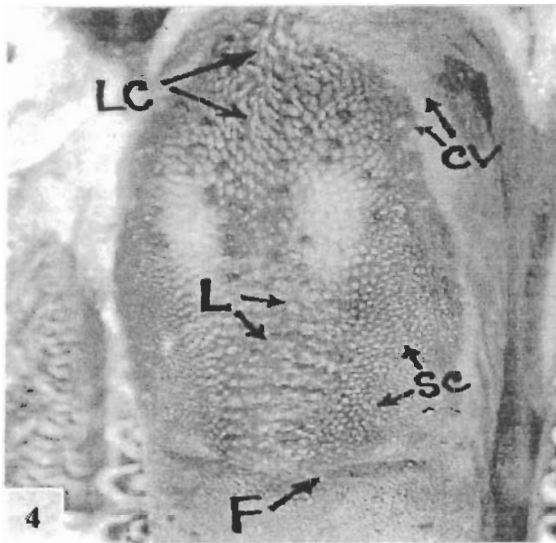


Fig. 4. Caudolateral part of the dorsum linguae showing circumvallate papillae (CV), small conical papillae (SC), large conical papillae (LC), lenticular papillae (L), and fossa linguae (F).

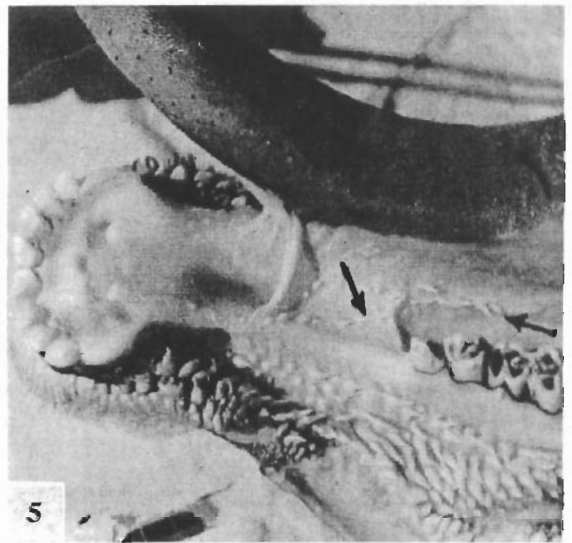


Fig. 5. Lateral surface of the frenulum linguae (after raising the tongue) showing pointed curved papillae (arrow).

Variably pigmented and club-shaped fungiform papillae were irregularly distributed all over the dorsum and along the margins of the tongue. These papillae decreased in number and increased in size from the tip to the dorsum. This similar finding was observed by Gupta and Sharma (1991) in Indian yak. On the other hand in ox, Mcleod (1958) and Raghavan (1964) reported that these papillae were limited on the dorsum from the fossa linguae to the tip and along the lateral margins of the tongue. These papillae were also found on the ventral surface of the tongue that was similar to the observation of Dhingra and Barnwal (1979) in Indian buffalo.

The lenticular papillae were broad headed, horny of lentil or mustard seed size, spread on either side of the mid-line in the rostral two-thirds of the dorsum, but better developed along the midline. Gupta *et al.* (1989) observed the same findings in Indian buffalo. The conical papillae were studded the mucosa of the dorsum linguae. The large conical papillae occurred in the rostral two-thirds of the dorsum with a higher concentration in its middle portion but the small conical ones occurred throughout the dorsum with a relatively thinner population in its rostral central third and caudal lateral segments. This observation was similar to Gupta *et al.* (1989) in Indian buffalo.

In the present findings, the vallate papillae were 13-19 on either side dispersed in 2-3 irregular rows (25-38 in total) along the caudo-lateral two thirds of the dorsum. Similar findings were observed in Indian buffalo by Gupta *et al.* (1989). In contrast with this observation Dhingra and Barnwal (1979) in buffalo reported that the vallate papillae between 33 and 39 in number were arranged in the form of an inverted "V" at the root of the tongue. On the other hand, in ox these numbered 8-17 on each side. Getty (1975) and Ghosh (1998) described that the vallate papillae are larger in size, 7-8 in number in each side and each papillae is encircled by a wall arranged in irregular double rows at the posterior part of the dorsal surface of the tongue.

The mucosa of the root of the tongue of *Bos indicus* did not show any specific papillae. It was rather smooth due to diffused lymphoid tissue (lingual tonsil) distribution. This observation was similar to Gupta and Sharma (1991) in Indian yak. In contrast with this observation, Gupta *et al.* (1989) in Indian buffalo reported that the mucosa of the root of the tongue was slightly swollen on either side and showed variably developed folds, indicating the fissures of the lingual follicles.

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