

HISTOARCHITECTURE STUDY OF SEBACEOUS GLANDS OF CATTLE BREEDS OF MAHARASHTRA IN DIFFERENT CLIMATIC CONDITION

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Abstract: The present study was conducted on skin samples of 4 – 6 years of age healthy Deoni, Red kandhari, Dangi and Gaolao breeds of cattle managed under hygienic conditions on farm in different regions of Maharashtra. The skin samples, 10 of each breed were obtained surgically from loin region during winter and summer seasons separately.

The sebaceous glands were elongated to flask shaped simple alveolar or simple branched alveolar glands. They were consisted of closely packed mass of glandular cells without lumen. The most of glands were found in the connective tissue sheath of hair follicles. The number of sebaceous glands was found increased during winter season in all breeds of cattle.

Keywords: Sebaceous gland. Cattle, Climatic condition.

Material and Methods

The experiment was carried out on 40 female cattle of 4 – 6 years of age belonging to different breeds located in different regions of Maharashtra state during winter (November - February) and summer (March – June) seasons, separately. The skin samples, 10 of each were obtained from loin region of healthy Deoni, Red kandhari, Gaolao and Dangi breeds of cattle, managed under hygienic conditions on the farm in different regions of Maharashtra state. Tissue pieces of 5 mm size were cut to preserve in following fixatives for the histomorphological study.

1. 10% Neutral buffered formalin
2. 10% formalin
3. Bouin's fluid

After fixation, tissues were washed in running tap water for overnight. These were then processed for routine paraffin technique. The tissues were first passed through ascending grades of alcohol, cleared in xylene, infiltrated in three changes of paraffin (melting point 580-600C) and then embedded in paraffin by employing manual tissue processing schedule suggested by Drury and Wallington (1980).

The longitudinal and transverse tissue sections of 4 to 5 μ thickness were obtained on manually operated rotary microtome. The sections were mounted on glass slides and dried at room temperature for 24 hours and were preserved carefully for staining. The following staining methods were used for histomorphological studies.

- a) Harri's Haematoxylin and Eosin stain for normal histoarchitectural study (Mukharjee, 1992).
- b) Van Gieson's stain for collagen fibers (Singh and Sulochana, 1996).
- c) Masson's trichrome method for collagen fibers (Luna, 1968).
- d) Silver impregnation stain for Reticular fibers (Mukherjee, 1992).
- e) Wilder's method for reticulin (Luna, 1968).
- f) Verhoeff's stain for elastic fibers (Mukharjee, 1992).
- g) Crossman's modification of Mallory's triple stain for collagen and elastic fibers (Singh and Sulochana, 1996).
- h) Periodic acid Schiff's (PAS) stain for carbohydrate like glycogen, mucin and reticulin (Mukharjee, 1992).

The micrometrical recordings were taken under simple microscope by micrometer scale after calibration at 10X ($1\mu = 15.38$ graduations) and 40 X power ($1\mu = 3.30$ graduation) magnifications.

The data collected was subjected to the statistical analysis as per the standard procedure suggested by Panse and Sukhatme (1967).

Results and Discussion

In present work, sebaceous glands in all breeds of cattle were simple alveolar or simple branched alveolar type located in the papillary layer of dermis. These glands were associated with hair follicle and most of them were found in the connective tissue sheath of hair follicles. The secretory units of glands were elongated to flask shaped, opened with short ducts in the hair canal (Plate 1).

It was noticed that, during winter season, glands were larger in size and two to three sebaceous glands were found associated with single hair follicle in all breeds of cattle. Association of two to three sebaceous glands with each hair follicle were found more common in Red Kandhari and Dangi breed of cattle during winter season. (Plate 2)

Each secretory unit of sebaceous glands showed closely packed mass of cells without lumen. The cells towards the periphery of glands were smaller with distinct nucleus and showed some mitotic activity. Whereas, centrally placed glandular cells were large polyhedral shaped

with variably positioned nuclei and cytoplasmic vacuolation. However, the cells near the glandular duct were disintegrated with pyknotic nuclei in all breeds of cattle and seasons during present work (Plate 3).

These findings of the present study are in line with the reports made by Jenkinson and Nay (1972). They stated that sebaceous glands were associated with hair follicle in European breed of cattle. Nagaraju *et al.* (2012) reported that sebaceous glands were present on either side of hair follicle in cattle. However, they claimed that large segment of sebaceous gland was supported by two minor segments. Mugale and Bhosle (2001) reported that sebaceous glands in Deoni cattle were simple to branched alveolar type located in the papillary layer of dermis. However, in contrary to present observations they reported that the glands were multilobulated consisted of squamous secretory cells with centrally placed nuclei. Similarly, Samuelson (2007) stated that sebaceous glands in domestic animals were of simple branched alveolar type.

The present findings confirmed the reports of Monteiro-Riviere (2007) in domestic animals that sebaceous glands were consisted of solid mass of epidermal cells. The peripheral glandular cells were of mitotically dividing low cuboidal cells and the cells near the duct of glands contained pyknotic nucleus. However, they mentioned that glands were of simple branched to compound alveolar type. This difference in the morphology of gland with present findings may be attributed to species variation.

The increase in size and association of two or three sebaceous glands with each hair follicle during winter season, observed during present study may be attributed to increased secretory function of sebaceous gland which may be accomplished by the more secretion of sebum by glands during winter season may helps to maintain the texture and flexibility of skin during dry weather of winter season.

The average number of sebaceous glands per cm² are presented in table 1. During present work, a significant increase in the number of sebaceous glands per cm² was observed in all breeds of cattle during winter season. The average number of sebaceous glands during summer was recorded as 713.28 ± 16.37 , 762.24 ± 21.99 , 734.26 ± 19.88 and 678.32 ± 19.87 , whereas, during winter season, it was recorded as 797.20 ± 9.85 , 867.13 ± 10.30 , 835.66 ± 20.78 and 716.78 ± 10.16 in Deoni, Red Kandhari, Dangi and Gaolao breeds of cattle, respectively.

During present work, the number of sebaceous glands per cm² differed significantly among breeds in both seasons. However, non-significant difference was observed between Deoni,

Red Kandhari and Dangi cattle during summer season. Similarly, non-significant difference was recorded between Red kandhari and Dangi cattle during winter season. Significant increase in number of sebaceous glands during winter season in all breeds of cattle may be accomplished by correlation between seasons and functions.

The function of sebaceous gland was reported by Monteiro-Riviere (2007) and Samuelson (2007) in domestic animals. They stated that the oily secretion of sebaceous glands known as sebum that functions as antimicrobial and water proofing agent by lubricating the epidermis. Thus, the number of sebaceous gland may be increased during rainy season for more secretion of sebum to protect the skin from heavy moisture, which may lead to skin infections. As, the rainy season is followed by winter, the number of sebaceous glands may appear more in winter than summer.

The more number of sebaceous glands during winter season may be attributed to the necessity of more sebum secretion to prevent the xerosis of skin during winter season. This can also be justified by the reports of Akers and Denbow (2008), who stated that sebum functions as a natural skin cream to keep skin soft.

Table 1: Mean and SE of number of sebaceous glands per cm² of skin during summer and winter seasons in Deoni, Red Kandhari, Dangi and Gaolao cattle

Number of sebaceous glands per cm ²				
Season	Deoni	Red Kandhari	Dangi	Gaolao
Summer	713.28A2 ± 16.37	762.24A2 ± 21.99	734.26A2 ± 19.88	678.32B2 ± 19.87
Winter	797.20B1 ± 9.85	867.13A1 ± 10.30	835.66A1 ± 20.78	716.78C1 ± 10.16

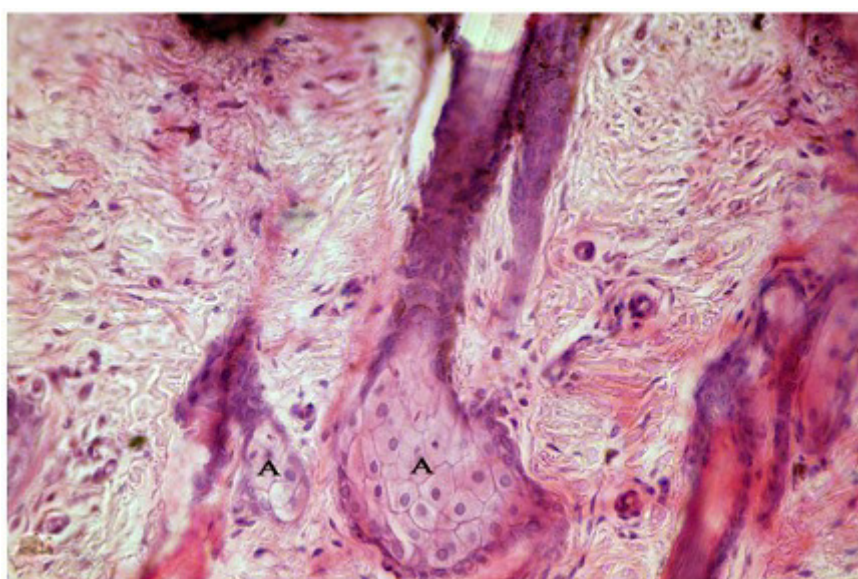


PLATE 1: Photomicrograph of skin of Gaolao cattle during summer season

A. Sebaceous gland

(Haematoxylin & Eosin stain, X 400)

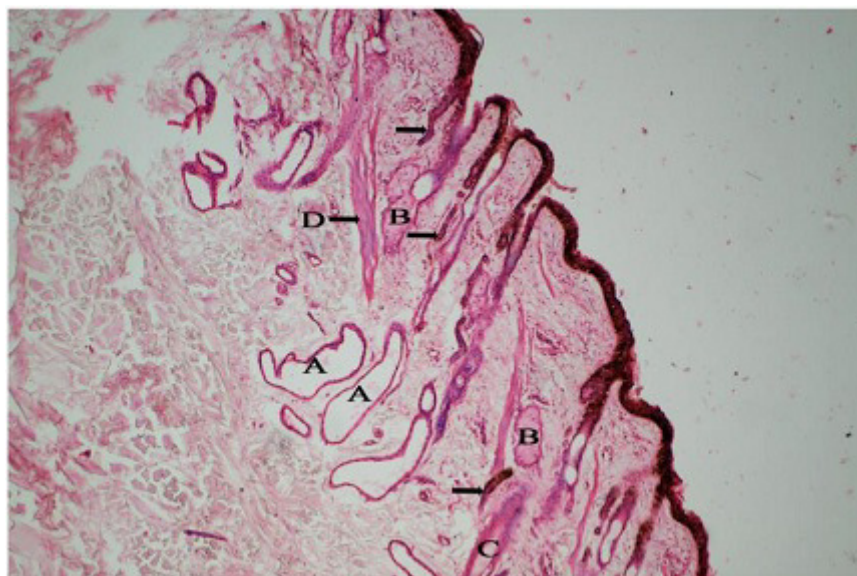


PLATE 2: Photomicrograph of skin of Deoni cattle showing Sebaceous during summer season

A) Sebaceous gland (Haematoxylin & Eosin stain, X100)

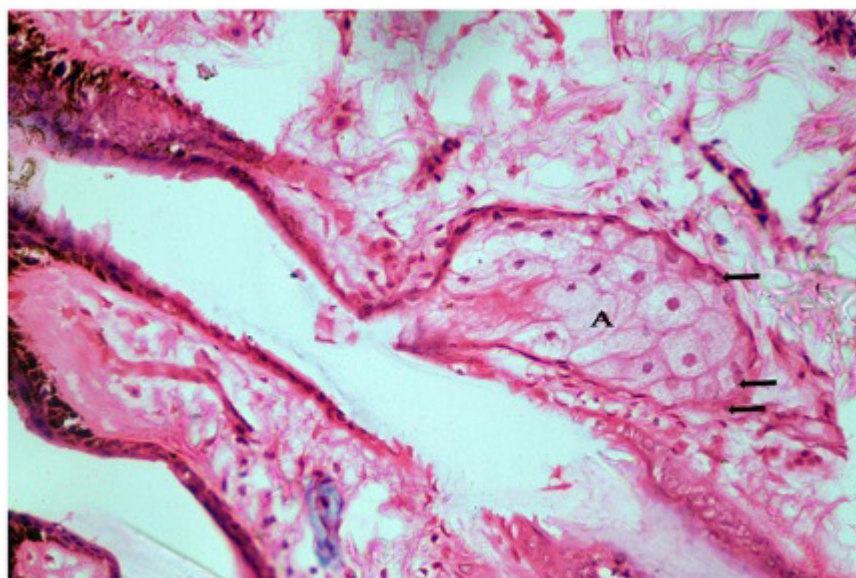


PLATE 3: Photomicrograph of skin of Deoni cattle during summer season

A. Sebaceous gland

Arrow showing mitotic activity in peripheral glandular cells
(Haematoxylin & Eosin stain, X 400)

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