

Review Article

HISTOLOGICAL STUDY OF HAIR FOLLICLES 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 hair follicles were unevenly distributed chiefly in the papillary layer of dermis. They were associated with sweat glands, sebaceous glands and arrector Pili muscles.

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

During present study, hair follicles were found unevenly distributed in the dermis in all breeds of cattle and season. They were chiefly located in the papillary layer of dermis. However, few hair follicles were observed in the reticular layer of dermis. They were externally covered by dermal root sheath and composed of outer root sheath, inner root sheath, cuticle, cortex and medulla (Plate 1 & 2).

All hair follicles in the present study were associated with the sweat gland, sebaceous gland and arrector pili muscle. However, most of hair follicles were found associated with two or three sebaceous glands during winter season in all breeds of cattle (Plate 3).

The present observations corroborates the finding of Akers and Denbow (2008) and Nagaraju *et al.* (2012) who recorded uneven distribution of hair follicles in cattle skin. Similar findings were made by, Mugale and Bhosle (2001) in Deoni cattle and Patil *et al.* (2001) in Red Kandhari cattle. They reported that hair follicles were associated with sebaceous glands and composed of outer, inner root sheath, cuticle, cortex and medulla.

During the present work, all hair follicles were found associated with sweat gland, sebaceous gland and arrector pili muscle and indicated that hair follicles in all breeds of cattle under present study were of primary type. Similar findings were made by Carter and Dowling

(1954), Dowling (1955) and Jenkinson and Nay (1972) in European breed of cattle. They reported that hair follicles in cattle were only of primary type associated with sweat gland, sebaceous gland and an arrector pili muscle.

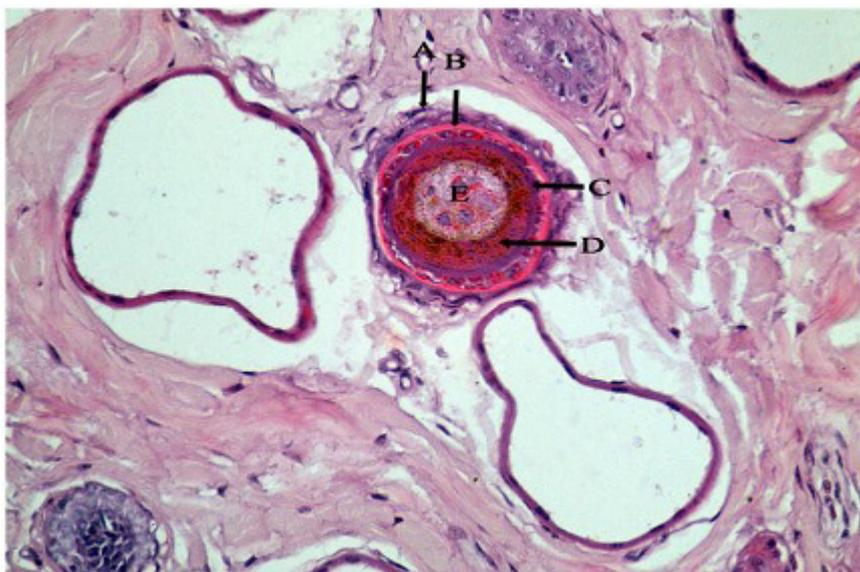


PLATE 1: Photomicrograph of skin of Red Kandhari cattle showing hair follicle during winter season

- A. Dermal root sheath
- B. Outer root sheath
- C. Inner root sheath
- D. Cortex
- E. Medulla

(Haematoxylin & Eosin stain, X 400)

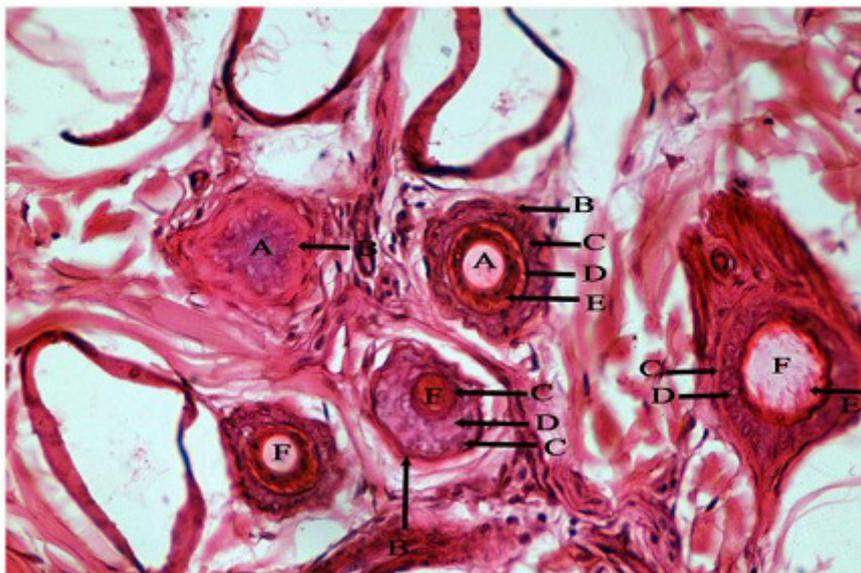


PLATE 2: Photomicrograph of skin of Dangri cattle during winter season showing of cross sections of hair follicles at various levels during winter season

- A. Hair papilla
- B. Dermal root sheath
- C. Outer root sheath
- D. Inner root sheath
- E. Cortex
- F. Medulla

(Haematoxylin & Eosin stain, X 400)

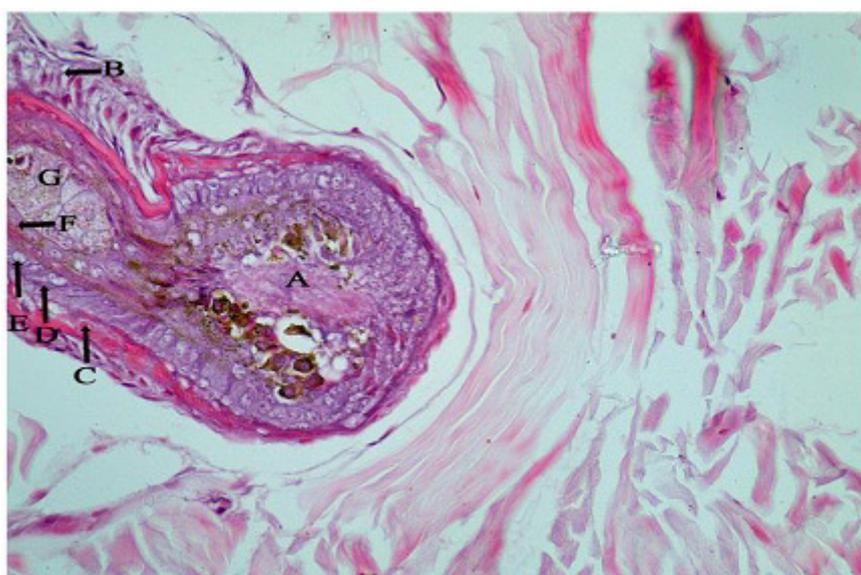


PLATE 3: Photomicrograph of longitudinal section of hair follicle in Deoni cattle during summer season

- A. Hair papilla

B. Dermal root sheath
C. Outer root sheath
D. Inner root sheath
E. Cuticle
F. Cortex
G. Medulla
(Haematoxylin & Eosin stain, X 400)

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