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RESEARCH ARTICLE

Histological and histochemical studies of hair follicles in crossbreed cattle

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Abstract : The hair follicles were found embedded in the connective tissue components of the dermis. These were found associated with one or two sebaceous glands and arrector pilli muscle. The hair follicles were few in number of lactating cow. These were elongated and extending upto the reticular layer in pregnant cow. The follicles were numerous in heifer and located in the papillary layer.

Key words : Histology, Histochemistry, Hair follicles, Crossbreed cattle

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INTRODUCTION

Indian cattle breeds are low milk producers as compared to the exotic breeds of the cattle. Due to this, crossbreed cattle are reared in India to increase the milk production per animal.The skin characters generally attract the interest for the selection criteria of animal. Similarly it helps to adapt the animals of the universe in different seasons.The crossbreed animals *i.e.* F_1 generation (50% Deoni x 50% Holstein) are reared in the high environmental temperature, resistant against the tropical diseases. Hence, the present investigation has been made to study the histology of the hairfollicles in crossbreed cattle (Deoni x Holstein F_1 generation) in different groups, *viz.*, heifers, pregnant and lactating cows.

RESEARCH METHODOLOGY

The present experiment was conducted on female crossbreed cattle (Deoni x Holstein F_1 generation). These animals were divided into following groups and each group comprising six animals:

Group1 Heifers
Group 2 Pregnant cows
Group 3 Lactating cows

All these animals were apparently healthy and reared under normal hygienic conditions on the farm. The skin

biopsy samples were collected in summer season

The obtained skin samples were washed in normal saline solution to remove blood clots. The samples were cut in convenient sizes by BP blade and were immediately kept in either of the following fixatives for preservation.

– 10 per cent formaline solution,

– 10 per cent neutral buffered formaline solution

After preservation for 48 hours, small pieces of the tissues were processed in the laboratory by adapting ascending grades of alcohol for dehydration and xylene for clearing, respectively. The tissues were then embedded in the paraffin wax of melting point 58 to 60^{0}C. The vertical and horizontal sections of 4 to 5 µ thickness were obtained on the glass slides by manually operated Rotatory Microtome Machine (Singh and Sulochana, 1997). Then the tissue sections were stained by the following staining methods.

– Harrie's haematoxyline and Eosin stain for general observation (Mukherjee, 1992).

– Weigert's Van Gieson stain for collagen fibres (Singh and Sulochana, 1997).

– Silver impregnation stain method for reticular fibres (Singh and Sulochana, 1997).

– Verhoeff's stain for elastic fibres (Mukherjee, 1992).

– Crossman's modification of Mallory's Triple stain for collagen and elastic fibres (Singh and Sulochana, 1997).

– Periodic Acid Schiff's (PAS) stain for carbohydrate like glycogen, mucin and polysaccharides (Mukharjee, 1992).

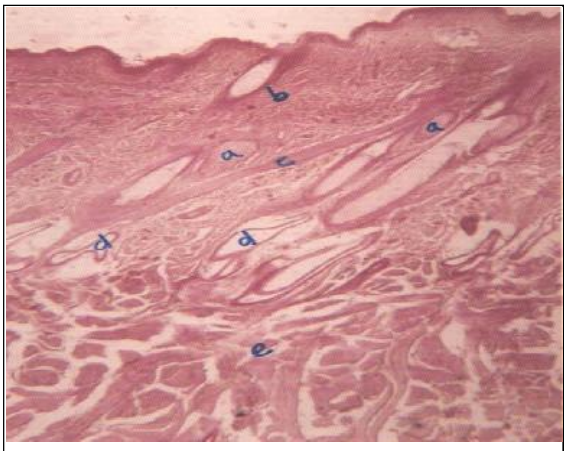
The stained sections were studied for various histological and histochemical parameters of the hairfollicles. The measurements were taken from vertical and horizontal sections under simple miscroscope by occular micrometer scale after calibration at low power and high power magnification.

The data collect were subjected to statistically analysis as per the standard procedures of Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

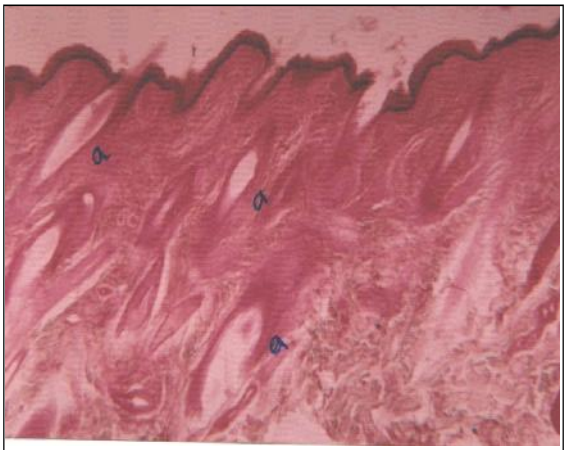
The hair follicles were found embedded in the connective tissue components of the dermis. They were consisted five components of inner root sheath, out root sheath, cuticle, cortex and medulla. The follicles were found associated with one or two sebaceous glands.These were also associated with erector pilli muscle.

The hair follicles were of short length with large diameter and located all over the papillary layer of the dermis and they were arranged slight oblique to the epidermis in heifers (Plate 1). They were of variable in sizes, numerous



(a) 1Hair follicle
(Periodic acid Schiff's stain, 100 X)

Plate 1 : Microphotograph of the skin from lactating cow showing



(a) Sebacous gland b) Hair follicle
(Periodic acid Schiff's stain, 100 X)

Plate 2 : Microphotograph of the skin from pregnant cow showing

Table 1 : Showing the measurement of depth, diameter and length of hair follicle

Group	Depth			Diameter			Length		
	Range (μm)	Mean (μm)	(±) S.E.	Range (μm)	Mean (μm)	(±) S.E.	Range (μm)	Mean (μm)	(±) S.E.
Heifer	322.87 to 559.64	459.04	37.63	191.10 to 264.60	217.56	15.67	215.49 to 298.50	248.91	15.10
Pregnant cow	298.69 to 417.18	363.10	25.68	102.90 to 176.40	135.24	12.62	278.67 to 310.21	295.54	5.50
Lactating cow	325.87 to 517.74	444.07	33.78	176.40 to 220.50	208.74	12.62	215.15 to 298.50	250.83	14.31
Average mean	363.10 to 459.04	422.07	32.36	135.24 to 217.56	187.18	13.64	248.91 to 295.54	265.09	11.64

in distribution in heifers (Plate 2). It also showed some epidermal downgrowth forming hair follicles in heifers. The follicles were also embedded into the reticular layer of dermis.

In lactating cow the hair follicles were least or very few in number extending upto the junction of papillary and reticular layer of the dermis. They were somewhat vertical and less numerous in the papillary layer.

In pregnant cow the hair follicles were elongated extending upto the junction of papillary and reticular layer with short diameter and running obliquely towards the epidermis.

The depth of hair follicle ranged from 322.87 to 549.64 μm with a mean 459.04 ± 37.63 μm in heifers, 298.69 to 417.18 μm with a mean 363.10 ± 25.68 μm in pregnant and 325.87 to 517.74 μm with a mean 444.072 ± 33.78 μm in lactating cow (Table 1). The depth of hair follicle was more in heifer than that of pregnant and lactating cow.

Average depth of hair follicle in crossbreed cow was found lower than the reports Nay and Jenkinson (1964) in European dairy cattle, Patel *et al.* (1988) in crossbreed cattle, Bhayani *et al.* (1989) in Kankrej cow and Bhayani and Vyas (1991) in Gir cattle. This might be due to the breed differences of cattle.

The diameter of hair follicle ranged from 191.10 to 264.60 μm with mean 217.56 ± 15.67 μm in beifers, 102.9 to 176.4 μm with mean 135.24 ± 12.62 μm in pregnant cow and 176.4 to 220.5 μm with mean 208.74 ± 12.62 μm in lactating cow (Table 1). The diameter was hair follicle was more in heifer as compared to other group of animals.

The length of hair follicle was ranged from 215.49 to 298.5 μm with mean 248.906 ± 15.10 μm in heifers, 278.67 to 310.21 μm with mean 295.536 ± 5.50 μm in pregnant cow and 215.15 to 295.50 μm with mean 250.83 ± 14.31 μm in lactating cow (Table 1). The length of hair follicle was more in pregnant cow than that of heifer and lactating cow.

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