



Connective tissue fibre arrangement in skin of crossbreed cattle

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Abstract : The collagen fibres were more as compared to other fibres in the papillary layer of the dermis running oblique indirection to skin surface in heifer and parallel to skin surface in pregnant and lactating cows. The elastic fibres were finely branched in the papillary layer than the reticular layer of the dermis and were arranged parallel to the epidermis in heifer, pregnant and lactating cows and vertical in direction at the hair bulb. The reticular fibres were more coarse than that of collagen and elastic fibres and were present in all the directions and were invented in the collagen and elastic fibres in the papillary layer of the dermis. The reticular layer of the dermis consisted of collagen, elastic and reticular fibres alongwith muscle fibres with dense arrangement horizontal to epidermis.

Key words : Connective tissue fibres, Skin, 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.* F₁ 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 CTF in crossbreed cattle (Deoni x Holstein F₁ generation) in different groups, *viz.*, heifers, pregnant and lactating cows.

RESEARCH METHODOLOGY

The present experiment was conducted on female crossbreed cattle (Deoni x Holstein F₁ generation). These animals were divided into following groups and each group comprising six animals:

- Group1 Heifers
 Group2 Pregnant cows
 Group3 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 and 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°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 skin epidermis. The measurements were taken from vertical and horizontal sections under simple microscope by ocular 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).

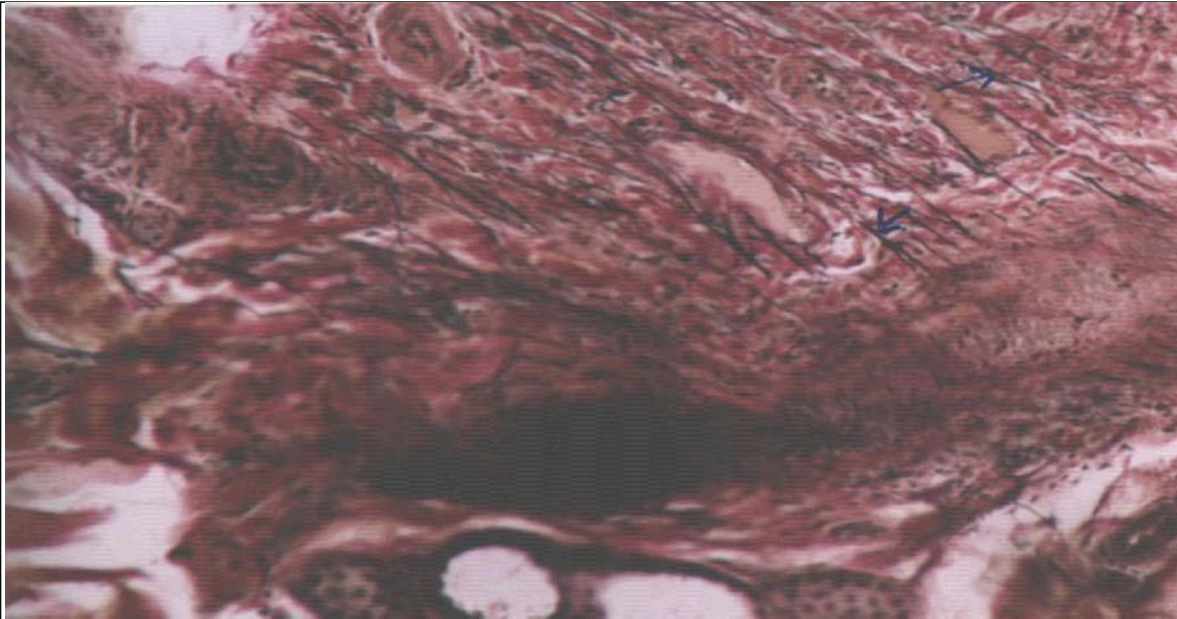
RESULTS AND DISCUSSION

The connective tissue fibres were observed as collagen, elastic and reticular fibres in the papillary and reticular layers of the dermis in all the groups of animals. (Plate 1 and 2). The connective tissue fibres as collagen, elastic and reticular fibres were observed in the dermis of the crossbreed cow in the present study. Similar findings were recorded by Shahjahan *et al.* (1977) in Murrah water buffaloes, Calhoun and Stinson (1981); Hossain *et al.* (1986) in water buffaloes, Leeson *et al.* (1988); Mugale (2000) in Deoni cattle and Hole (2003) in Red Kandhari cow.

The collagen fibres were usually arranged parallel to the skin surface and formed a close attachment of dermis to the epidermis. The collagen fibre were more as compared to other fibres in papillary layer of the dermis. The collagen fibres were arranged oblique in direction to the skin surface in heifers and parallel in lactating cows in the papillary layer of the dermis. The vertical arrangement of collagen fibres were found around the hair bulb and running towards epidermis. The hair follicle and sweat gland were surrounded by collagen fibres at the junction of papillary and reticular layers of dermis in pregnant cow.

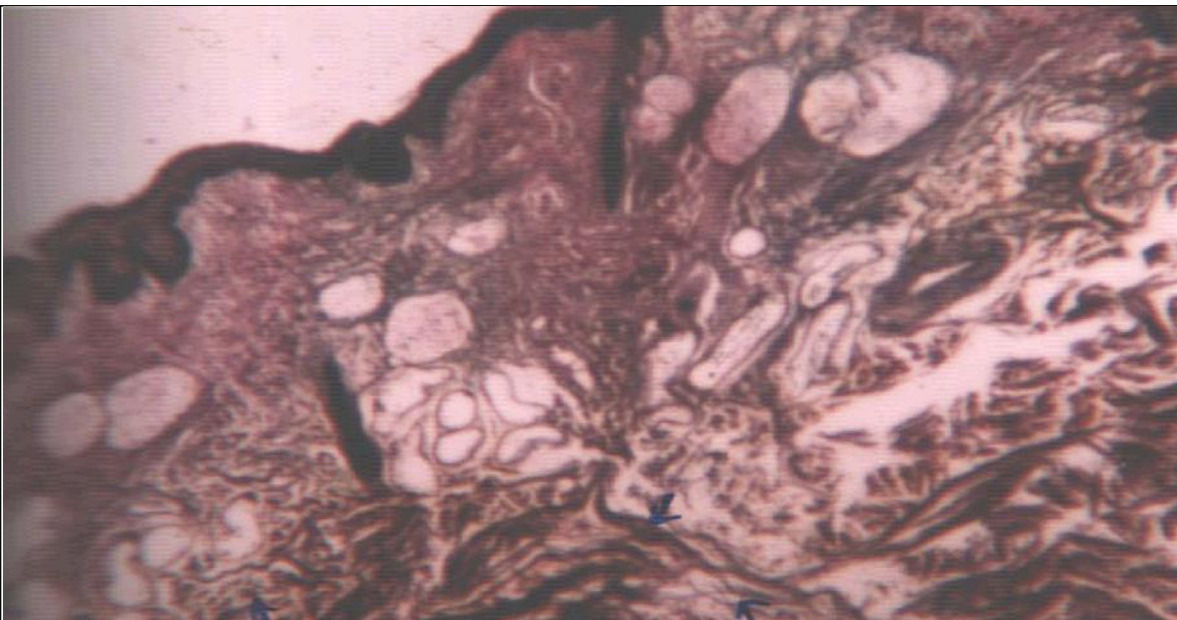
In the present study papillary layer of dermis consisted of more collagen fibres among the other fibres (Plate 3). However, Bhayani and Vyas (1991) reported that more elastic fibres present in the papillary layer than the reticular layer of the dermis in Gir cattle.

The elastic fibres were finely branched in the papillary layer than the reticular layer of the dermis. In heifers the elastic fibres were arranged in horizontal direction and were mixed with collagen fibres in the papillary layer of the dermis and were found at both the ends of erector pilli muscles attaching to hair follicles. In lactating cows the elastic fibres were arranged parallel to the skin surface and found at the junction of papillary and reticular layer of dermis. In pregnant cow the fibres were arranged in horizontal in upper part of hair follicle and vertical along with the bulb of hair follicle in the papillary layer of the dermis. Few elastic fibres were found in the papillary layer of the dermis in



Arrow indicating elastic fibres (Verhoeffs Stain, 400 X)

Plate 1 : Microphotograph of the skin from lactating cow showing



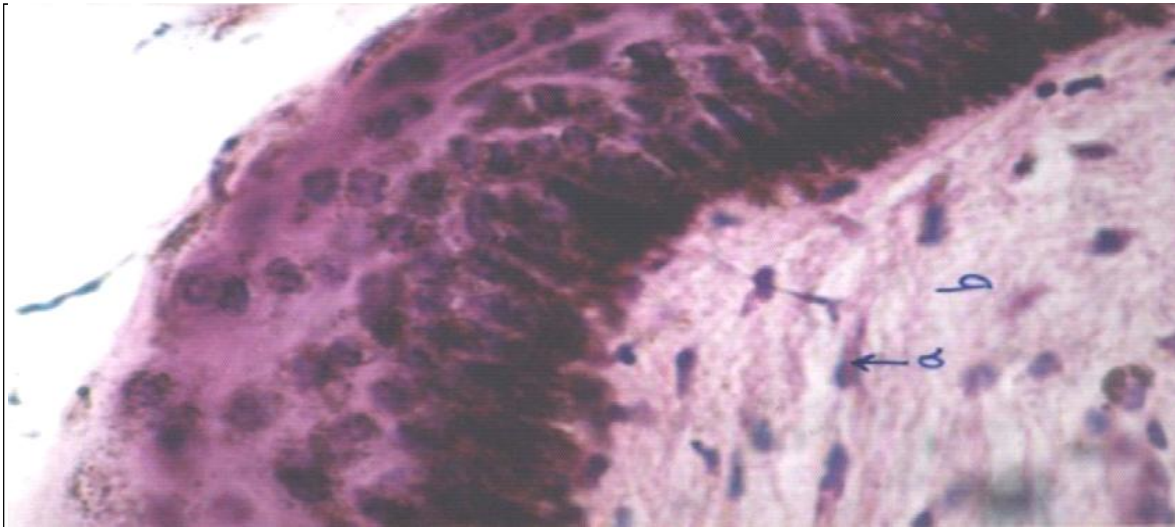
Arrow indicating reticular fibres (Silver impregnation Stain, 400 X)

Plate 2 : Microphotograph of the skin from lactating cow showing

pregnant cows than that of heifers and lactating cows in the present study.

The reticular fibres were more coarse than that of collagen and elastic fibres. The fibres were present in the all directions and mixed with other connective tissue fibres in the papillary layer in all the group of animals in the present study.

The fibres of connective tissue were present in irregular manner with dense arrangement in the reticular layer of the dermis in all the group of animals. Most of the fibres were running horizontal to skin surface but



(a) Fibroblast (b) Loose collagen fibres (Haematoxylin and Eosin stain, 400X)

Plate 3 : Microphotograph of the skin from heifer showing

some in vertical and obliquely directed fibres were also present in this layer of dermis in all the group of animals.

The reticular layer of the dermis consisted of connective tissue fibres with dense arrangement and running horizontal to the skin surface. Similar findings were recorded by Dellmann and Brown (1987) in domestic animals.

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