INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 05 Issue 06 June 2022

DOI: 10.47191/ijmra/v5-i6-20, Impact Factor: 6.261

Page No. 1336-1340

Histological study of Sweat gland in Cattle

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ABSTRACT: The depth of sweat gland of the skin in non-lactating cow at lateral surface was found higher in the present study and pregnant cow showed higher sweat gland length at dorsal aspect of the body. Whereas width was more in lactating cow. The sweat gland were tubule acinar glands. The secretary saccules were either oval or elongated in shape. The secretary portions were lined with flat cuboidal epithelial cells. These glands were located deeply in the dermis below the sebaceous glands. The secretary material was observed in the lumen of these glands. The sweat glands were lined by simple cuboidal epithelium with a oval nuclei.

KEY WORDS: Histology, Sweat gland, Cattle

INTRODUCTION

In the common domestic breeds the adequate data are not available in the literature. Hence, the present investigation has been made to study the histology of sweat glands.

MATERIALS AND METHODS

The experiment was conducted on 15 (fifteen) female cattle. The 15 cows were divided into following equal groups.

1. Lactating cows
2. Non lactating cows
3. Pregnant cows

The skin biopsy samples were collected at the site of Dorsal, lateral and ventral aspects at the level of the 7th rib.

The obtained skin sample was washed in normal saline solution to remove blood clots. The skin samples were immediately preserved on either of following fixatives.

Ten per cent formalin, ten per cent buffered neutral formalin, Bouin's fluid. After preservation small pieces of tissue were processed in the laboratory by adopting standard method of dehydration and clearing through ascending grades of Ethyl alcohol and xylene, respectively. The tissues were then embedded in the paraffin wax of melting point 56 to 58^{0}C. The longitudinal and transverse sections of 5 to 6 microns thickness from the tissue were obtained on the glass slide by manually operated rotary microtome machine (Singh and Sulochana, 1997). Then the tissue sections were stained by following staining methods.

a) Harrie's haematoxyline and eosin stain for general histology (Mukherjee, 1992).
b) Van Gieson's stain for collagen fibers (Singh and Sulochana, 1997).
c) Silver impregnation stain for Reticular fibers (Mukherjee, 1992).
d) Verhoeff's stain for vesicular and elastic fibers (Mukherjee, 1992).
e) Crossman's modification of Mallory's triple stain for collagen and Elastic fibers (Singh and Sulochana, 1997).
f) Periodic acid Schiff (PAS) stain for carbohydrate like glycogen, reticulum and mucin (Mukherjee, 1992).

The stained sections were studied for various histological and histomorphological parameters of sweat glands. The measurements were taken from longitudinal and transverse sections under simple microscope.

The data collected was subjected to statistical analysis as per the standard procedures of Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The sweat gland were tubule acinar glands. The secretary saccules were either oval or elongated in shape. The secretary portions were lined with flat cuboidal epithelial cells (Plate 1) . These glands were located deeply in the dermis below the sebaceous glands (Plate 2). The secretary material was observed in the lumen of these glands (Plate 2). The sweat glands were lined by simple cuboidal epithelium with a oval nuclei.

The myoepithelial cells were interposted between basement membrane and the tubular cells of the sweat gland. These cells formed basket like network around the secretary unit.

The sweat glands were found oval and rounded in lactating cows. In lactating cow, the sweat glands were densely arranged near to dermis as compared to non-lactating and pregnant cows.

The average depth of sweat glands of skin in pregnant cow was on the dorsal, lateral and ventral regions ranged from 624.16 to 993.56, 818.38 to 924.62 and 846.6 to 927.94 µm with a mean of 848 ± 26.70, 878.14 ± 13.23 and 874.99±13.97 µm, respectively. The average milk was 75 to 90 lit/30 days and fat per cent was 4.7. The density was decreased at the dorsal region and was higher in ventral region (Table 1).

The mean values of sweat gland length recorded at different body regions in cow ranged from 84.66 to 169.32, 116.2 to 132.8 and 107.90 to 124.50 µm, with a mean of 143.59 ± 7.6, 123.34 ± 2.35 and 114.04 ± 1.6 µm at dorsal, lateral and ventral body regions, respectively (Table 2).

The mean values of sweat gland diameter in cow are presented in the table 7. The sweat gland diameter ranged from 12.92 to 121.78, 76.36 to 94.66 and 64.70 to 76.36 µm, with a mean of 112.38 ± 1.57, 80.17 to 0.9 and 69.21 ± 1.13 µm at dorsal, lateral and ventral body region, respectively.

In non-lactating cow the sweat gland was found tubular and coiled. The average depth of sweat glands of skin in cow was at the dorsal, lateral and ventral regions ranged from 727.08 to 946.20, 828.34 to 926.28 and 776.88 to 945.50 µm, with a mean of 872.99 ± 26.72, 884.61 ± 13.25 and 841.88 ± 13.95 µm, respectively. The density decreased in the dorsal region and was higher in ventral region.

The mean values of sweat gland length recorded at different body regions of cow ranged from 205.80 to 239.04, 154.38 to 192.56 and 169.32 to 185.92 µm with a mean of 215.10 ± 7.4, 164.67 ± 2.37 and 178.95 ± 1.5 µm at dorsal, lateral and ventral regions, respectively. The mean values of sweat gland diameter in cow are presented in the Table 3.

The sweat gland diameter ranged from 49.80 to 63.08, 56.44 to 63.08 and 46.48 to 58.10 µm with a mean of 56.10 ± 1.57, 57.93 ± 0.8 and 51.29 ± 1.15 µm in dorsal, lateral and ventral body regions, respectively.

The sweat glands were bowl and gourd type in the pregnant cows. The average depth of sweat glands in cow at the dorsal, lateral and ventral regions ranged from 682.26 to 833.32, 750.32 to 896.40 µm and 813.40 to 932.92 µm with a mean 712.13 ± 26.73, 822.29 ± 13.23 and 880.13, 13.95 µm, respectively. The average milk yield was 75 to 90 lit/30 days and fat per cent was 4.7. The density was decreased at the dorsal region and found higher at ventral body region.

The mean values of sweat gland length recorded at different body regions in cow ranged from 232.40 to 249.00 µm, 195.88 to 29.16 and 174.30 to 184.26 µm with a mean of 239.87 ± 7.6, 203.18 ± 2.39 and 180.61 ± 1.5 µm in doral, lateral and ventral regions, respectively.

The mean value of sweat gland diameter in cow was presened in the Table 7. The sweat gland diameter ranged from 81.34 to 89.64, 48.10 to 58.10 and 79.68 to 86.32 µm with a mean of 85.56 ± 1.59, 52.94 ± 0.8 and 83.00 ± 1.13 µm at dorsal, lateral and ventral body region, respectively.

The mean values of sweat gland depth below the skin surface in cow was found somewhat similar as recorded by the Nay and Hayman (1956) and Govindaiah (1979) in Zebu and European cattle. Benjamin and Nair (1963) and Choudhary and Sabhu (1963) in Hariana crossbred, Patel (1984) in Kankrej crossbreds, and Bhayani *et al.* (1989) in kankrej cows.

The length of sweat glands recorded in cow was found lesser when compared with the reports of Findlay and Yang (1950) in Aryshire cattle, Chaudhary and Sadhu (1963) in Hariana cattle, Pan (1963) in Sahiwal cattle. Nay and Jenkinson (1964) in British dairy cattle. Amakiri (1974) in Friesian cattle, Patel (1984) in kankrej crossbreds and Bhayani *et al.* (1989) in kankrej cows. This variation found in length of sweat gland might be due to the breed difference.

The mean diameter of sweat gland in cow was found lesser when compared with the reports of Findlay and Yang (1950) in Aryshire cattle and Bhayani *et al.* (1989) in kankrej cows.

Table 1: Showing the measurements of the depth of sweat gland

Region / group	Dorsal		Lateral		Ventral	
	Range	Mean+SE	Range	Mean+SE	Range	Mean+SE
Lactating (µm)	624.16-993.56	848.56±26.70c	818.38-924.62	878.14±13.23b	846.60-927.94	874.99±13.97b
Non-lactating (µm)	727.08-946.20	872.99±26.72a	828.34-926.28	884.61±13.25b	776.88-945.50	841.88±13.95
Pregnant (µm)	682.26-833.32	772.73±26.73b	750.32-896.40	822.29±13.23a	813.40-932.92	880.13±13.95
	Sig.		S1		S2	

S1 = significant at 1% level
Sig = significant at 1% level
S2 = significant at 1% level

Table 2: Showing the measurements of the length of sweat gland

Region / group	Dorsal		Lateral		Ventral	
	Range	Mean+SE	Range	Mean+SE	Range	Mean+SE
Lactating (µm)	84.66-169.32	143.59±7.6a	116.20-132.80	123.34±2.35a	107.90-124.50	114.04±1.6
Non-lactating (µm)	205.80-239.04	215.10±7.4b	154.38-192.56	164.67±2.36b	169.32-185.92	178.95±1.5
Pregnant (µm)	232.40-249.00	239.87±7.6c	195.88-209.16	203.18±2.39c	174.30-184.26	180.61±1.5
	Sig.		S1		S2	

S1 = significant at 1% level
Sig = significant at 1% level
S2 = significant at 1% level

Table 3: Showing the measurements of the width of sweat gland

Region / group	Dorsal		Lateral		Ventral	
	Range	Mean+SE	Range	Mean+SE	Range	Mean+SE
Lactating (µm)	12.92-121.78	112.38±1.57a	76.36-84.66	80.17±0.9a	64.70-76.36	69.21±1.13a
Non-lactating (µm)	49.80-63.08	56.10±1.57b	56.44-63.08	57.93±0.8b	46.48-58.10	51.29±1.15b
Pregnant (µm)	81.34-89.64	85.56±1.59c	48.10-58.10	52.94±.8c	79.68-86.32	83.00±1.13
	Sig.		S1		S2	

S1 = significant at 1% level
Sig = significant at 1% level
S2 = significant at 1% lev

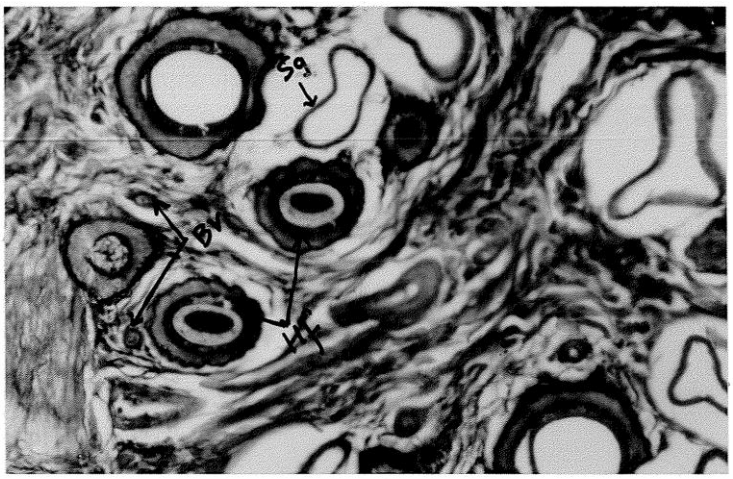

Plate 1: Microphotograph of transverse section of skin from lactating cow showing Sg – Sweat gland, Bv – Blood vessel, Hf – Hair follicle

Plate 2: Microphotograph of transverse section of skin from lactating cow showing Sg – Sebaceous gland, Sba – Sweat gland activity, Sg1 – sweat gland (Haematoxylin and Eosin Stain, 100x)

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