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SURVEY OF INCIDENCE OF VARIOUS SURFACE DEFECTS IN GOAT AND SHEEP SKINS IN MADRAS

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23,429 goat skins and 37,026 sheep skins were examined to find out the incidence of various surface defects in them. 33.44 per cent of goat skins and 14.68 per cent of sheep skins were found to be affected in quality. Major defects common to both goat and sheep skins were abscess, fire-mark, and psoroptosis. In addition to the above common defects demodecosis and sheep pox appreciably deteriorated the quality of goat and sheep skins respectively. Seasonal variation in the incidence of the major defects were also studied.

Introduction

Various agents and factors have so far been reported which are responsible for surface defects in Indian goat and sheep skins. Some of the surface defects are, however, common for different types of hides and skins, but some others may be specific for either goat or sheep skins. It is also possible that the aetiological agent for an unknown or less known defect has not yet been reported or its effect on the quality of leather has not been emphasized properly. Informations are very much lacking about the incidence of various surface defects in Indian goat and sheep skins. Before taking any step to improve upon the quality of such defective skins, precise knowledge about the defect in regard to its incidence and deteriorating effect on skin quality is to be obtained. A survey on the surface defects present in Indian goat and sheep skins

has therefore been undertaken. In the present instance the slaughtered skins, originating from Andhra Pradesh and Tamil Nadu that are available in Madras slaughter house, have been taken into consideration and the seasonal variation in surface defects has been recorded for a period of 12 months.

Materials and methods

Freshly slaughtered goat and sheep skins were collected from the Perambur slaughter house, Madras. Animals that are slaughtered here are brought from areas surrounding Madras city and from border regions of Andhra Pradesh—the adjacent state. Age of the animals slaughtered ranged between 1 to 3½ years (males 1-1½ years and females 2½ to 3½ years). Weight of the skin varied from 1.0 to 2.5 kg. To examine the skins, visits to slaughter house were made twice or thrice

a week. The defects were observed visually on the spot and skins with specific lesions or defects were collected and examined at Central Leather Research Institute with the help of a grading box, (Fig. 1) using transmitted light.

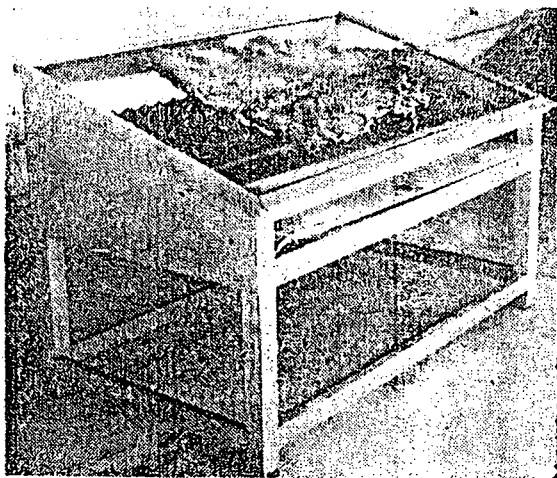


Fig. 1: Grading Box used for examining surface defects of skins.

Results

23,429 goat skins and 37,026 sheep skins were examined over a span of 12 months (April 1976 to March 1977) for various surface defects prevalent in them. Of the total skins examined 7,835 goat skins and 5,434 sheep skins were found to be affected in quality. The incidence of various surface defects in goat and sheep skins are recorded in Tables 1 and 2 respectively.

The monthly variation in the incidence of some of the major defects in goat and sheep skins are presented in Figures 1a, 1b and 2a, 2b respectively. As mentioned earlier, observations are limited to the slaughtered skins available in Madras.

It is quite apparent from Tables 1 and 2 that demodecosis, abscess, fire-mark and

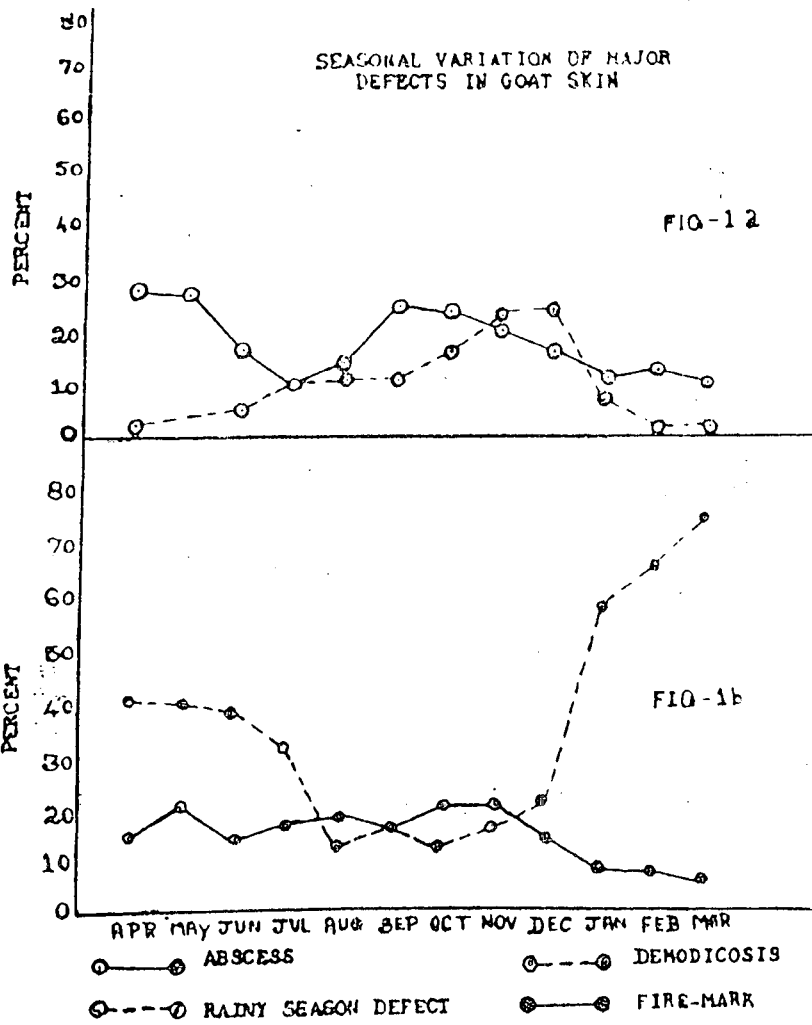
rainy season defect are mainly responsible for the surface defects in goat skins and abscess, fire-mark, pox, flay cut and sheep scab are the principal factors responsible for surface defects in sheep skins

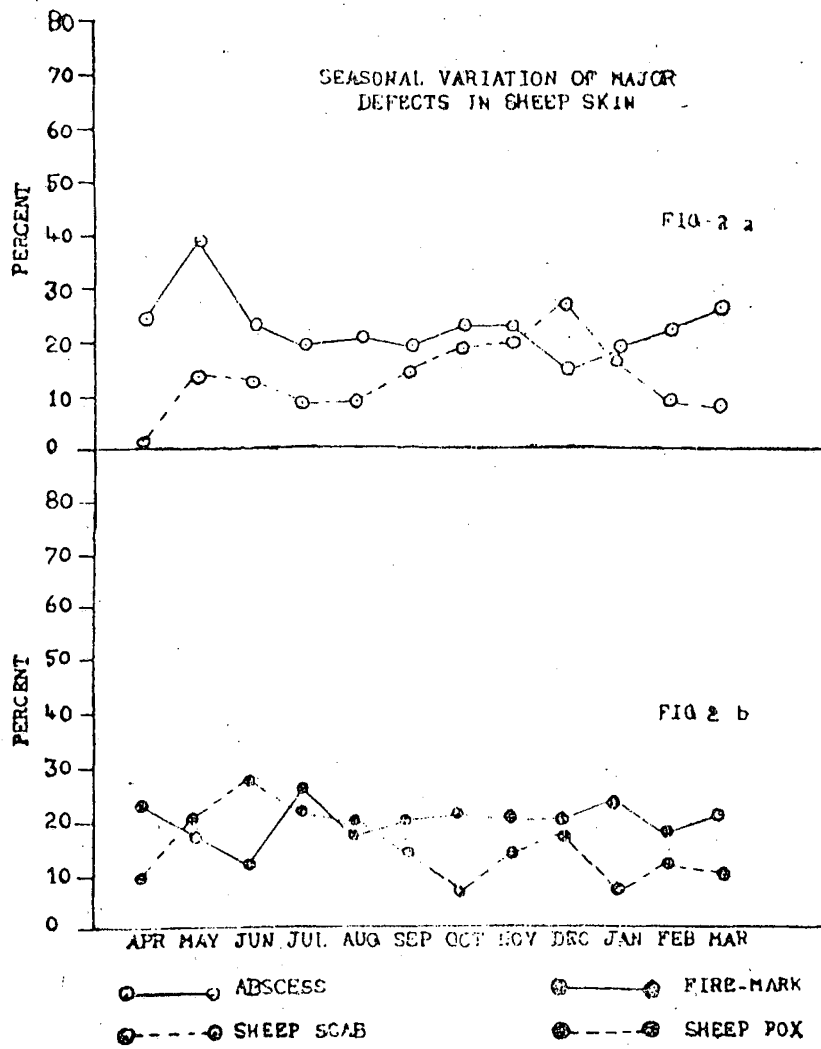
Of the various surface defects, demodecosis is found to be confined specifically to goat skins and bobble to sheep skins.

Figs. 1a and 1b indicate the seasonal variation in the incidence of certain surface defects in goat skins. Incidence of abscess in goat appears to be maximum during the months of April and May and a second peak is noted during the months of September. Two lean periods are noted, one in the month of July and the other in January. Rainy season defect is significantly low in the months from February to April. It increases steadily and reaches the maximum level during the month of December after which it declines drastically. Incidence of demodecosis shows greatest variation; the highest peak appears during the month of March, and the optimum period ranges from January to June. The lean period appears to be August and the minimum range spreads from August to November. Fire-mark in goat skin is fairly constant during the months of April to December and shows a downward trend during the months of January to March.

It is apparent from Fig. 2a that more sheep skins are affected in quality due to abscess during the month of May and less in the month of December and during the other months of the season, the incidence does not vary to any great extent. The incidence of sheep-scab is rather negligible in the month of April. During the months of May to August there is not much variation in psoroptosis in sheep but from August, it increases steadily and reaches

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the maximum level in the month of December, after which it declines again.

As regards fire-mark in sheep skin (Fig. 2b), no definite trend may be noted; but it can be pointed out that fire-mark defect prevails throughout the year. May to August appears to be optimum period for sheep pox defect, the maximum incidence being recorded in the month of June. As the prevalence of fire-mark in Indian goat and sheep skins has not yet been well emphasized earlier the relevant details on this problem will be dealt with in a separate publication.

The incidence of various other minor surface defects of goat and sheep skins occurring throughout the season (April 1976 to March 1977) has been recorded. The results obtained are expressed as per cent incidence on total defective skins examined and are presented in Tables 3 and 4.

While considering the minor defects in goat skin it may be noted from Table 3 that pox and flay cuts are consistently present throughout the season whereas subcutaneous haemorrhage is present in all other months except April and May. Incidence of pox is significantly high during the months of July and August. On gross examination of the skins for pox, circular or semi-circular spots as evident on the flesh side without having any unhealed scab or hairless patches, were also considered as 'pock marks' following the trade practise. There seems to be a correlation between the incidence of flay cuts and abscesses as flay cuts are found to be more in abscess affected areas of skin. Of the other biological defects, sarcoptosis is found to occur during post-monsoon and winter months and probably among those goats which had the opportunity in grazing forest area. Incidence of goat dermatitis is noted during post-monsoon period only.

In sheep skins, however, (Table 4) flay cut is the only defect which persists throughout the year. Sub-cutaneous haemorrhage is found to occur in all the months except March to May. This is caused by ruthless beating of the animals which give rise to severe localised congestion on the flesh side of the skin. Cyst of sheep skins, on examination are found to be of epidermoid cyst, and its occurrence is not so common. The other defect in sheep skin, known locally as "Bobble" is found to occur during eight months of the season. The lesion is characterised by raised oedematic swellings varying in size from 0.5 cm. to 2.5 cm. Such individual lesions may occur as discrete and isolated or several such lesions may be coalesced to form large areas usually visible on the flesh side and not on the grain side of the skin. The aetiological agent of this defect and the extent of damage to leather is yet to be ascertained.

Discussion

It is apparent from the survey results obtained, that the surface defects affecting the quality of goat and sheep skins are mainly caused by different biological agents and due to fire-mark. Of these, 'demodectosis' in goat skin is caused by demodectic mange mites and 'rainy season defect' in goat and 'sheep scab' in sheep are caused by psoroptic mange mites. The influence of environmental conditions on the bionomics of such mange mites are well recognised.¹ The climatic conditions prevailing in Madras during the period of observations (April 1976 to March 1977) are given in Table 5. The entire year could be divided into four seasons e.g. winter (January and February), hot weather (March to May), monsoon (June to September) and post-monsoon (October to December).

TABLE I

Surface defects in goat skins

<i>Defects</i>	<i>Percent on total skins examined</i>	<i>Percent on total defective skins examined</i>
1. Demodecosis	15.22	45.50
2. Abscess	5.05	15.09
3. Fire-mark	4.08	12.20
4. Psoroptosis (Rainy season defect)	3.11	9.29
5. Goat pox	2.07	6.20
6. Flay cut	1.72	5.13
7. Sub-cutaneous haemorrhage	0.75	2.23
8. Sarcoptic mange	0.66	1.98
9. Cyst	0.28	0.83
10. Goat dermatitis	0.20	0.58
11. Veininess	0.09	0.28
12. Tick infestation	0.08	0.24
13. Coal tar coated skins	0.04	0.11
14. Scratch marks	0.05	0.14
15. Lice infestation	0.009	0.03
16. Melanoma	0.009	0.03

TABLE 2
Surface defects in sheep skins

<i>Defects</i>	<i>Percent on total skins examined</i>	<i>Percent on total defective skins examined</i>
1. Abscess	3.42	23.32
2. Fire-mark	3.06	20.83
3. Psoroptosis (sheep-scab)	2.53	17.22
4. Sheep pox	2.24	15.24
5. Flay cut	1.92	13.10
6. Sub-cutaneous haemorrhage	0.67	4.56
7. Bobble	0.38	2.58
8. Epidermal cyst	0.35	2.37
9. Tick infestation	0.08	0.55
10. Veininess	0.01	0.09
11. Scratch marks	—	—
12. Lice infestation	0.005	0.04
13. Strike	0.002	0.02

TABLE 3
Percentage of incidence of minor defects in goat skins

<i>Months (1976-77)</i>	<i>Ticks</i>	<i>Pox</i>	<i>Flay cut</i>	<i>Sub-cur- aneous haemorrhage</i>	<i>Cyst</i>	<i>Scratch mark</i>	<i>Goat dermati- tis</i>	<i>Sarcoptes</i>	<i>Tar coated</i>	<i>Veini- ness</i>	<i>Lice</i>	<i>Melanoma</i>
April	—	3.75	3.75	—	—	1.25	—	1.25	—	—	—	—
May	—	1.07	5.37	—	—	—	—	4.30	—	—	—	—
June	1.30	7.39	5.21	6.08	—	1.73	0.86	0.43	—	—	—	—
July	—	31.55	4.88	2.66	—	—	—	—	—	—	—	—
August	0.59	18.16	9.38	5.98	0.19	—	—	—	—	—	—	—
September	—	11.88	6.78	5.65	0.99	0.14	0.28	0.14	0.56	—	—	—
October	1.81	6.96	5.29	2.78	2.64	—	1.11	0.69	—	2.50	0.27	0.13
November	—	6.82	4.39	4.14	2.19	—	2.68	2.19	—	—	—	—
December	—	7.57	6.14	2.14	1.28	0.14	2.42	4.42	—	0.57	—	—
January	—	2.26	4.00	0.52	0.26	0.17	0.52	4.43	—	—	—	0.08
February	—	2.64	5.23	1.16	0.80	0.12	—	3.07	—	—	—	—
March	—	1.36	3.29	0.57	0.28	—	—	0.14	0.35	—	—	—

TABLE 4

Percentage of incidence of minor defects in sheep skins

<i>Months (1976-77)</i>	<i>Ticks</i>	<i>Flay cut</i>	<i>Sub-cut- aneous haemorrhage</i>	<i>Epidermal cyst</i>	<i>Veininess</i>	<i>Lice</i>	<i>Bobble</i>	<i>Strike</i>
April	—	38.23	—	—	—	—	—	—
May	—	6.06	—	—	—	—	—	—
June	—	13.95	3.87	—	—	—	—	—
July	—	10.37	6.60	—	—	—	0.47	—
August	1.41	11.58	6.63	0.70	—	—	3.81	—
September	0.29	12.47	7.02	3.06	0.29	—	1.68	0.09
October	2.43	11.41	3.19	2.73	0.30	0.15	1.21	—
November	—	11.22	2.13	2.67	—	—	—	—
December	—	10.86	2.94	1.28	—	—	2.02	—
January	—	15.87	1.89	2.13	—	—	3.79	—
February	—	16.09	6.91	3.45	—	—	3.57	—
March	0.21	15.01	—	4.22	—	0.21	6.34	—

TABLE 5

Humidity, temperature and rainfall prevailing in
Madras city area for the year 1976-77

Months of the year 1976-77	Humidity (percent)	Temperature (°C)		Rainfall for 24 hr. in mm (08.30 hr. to 08.30 hr.)
		max	min	
April	75	34.2	26.0	trace
May	69	39.1	28.0	trace
June	72	36.6	26.6	81.6
July	79	33.9	25.3	175.9
August	81	32.8	24.5	328.2
September	76	34.1	25.7	23.4
October	82	31.3	24.7	370.8
November	91	29.4	23.4	807.3
December	87	28.8	22.7	13.2
January	78	28.6	19.9	1.0
February	76	29.9	22.0	5.0
March	81	31.9	23.9	0.0

It may be noted that demodexosis is encouraged during winter and early hot weather when the rainfall is practically nil and the prevailing temperature is comparatively low. On the other hand, the incidence of infestation is in the low ebb during the later part of the monsoon and post-monsoon periods, when the rainfall is significantly high. It may be possible that these parasites attain greater activity during the post-monsoon period, when they infest the animals. After infestation it may take two or three months for the nodules to develop when they become distinctly visible. Bhaskaran *et al*²

recorded a low incidence of demodexosis in September and high incidence (50 per cent) during hot weather. But in the present study a very high percentage (77 per cent) of incidence has been recorded during the month of March. It may, however, be pointed out that during January-March, the developed nodules were very minute and were frequently found in the fore or hind shanks (preferably fore-shanks). Unless the skins are carefully examined in direct sunlight it is quite likely to miss a demodectic infested skin. In many occasions well developed nodules were also absent in the main body of the skin.

As regards the incidence of psoroptic mange in goat and sheep skins the trend of variation is somewhat similar, the post-monsoon period being the optimum season and the early hot weather being the lean period. A similar observation was reported earlier relating to the incidence of 'rainy season defect' in goat skin. It is expected that psoroptes infestation will be maximum when a high humidity prevails and that is achieved during the post-monsoon period.

Abscess are found to occur maximally during the months of April and May both in goat and sheep skins. As abscesses are caused by different types of microorganisms and the informations available on them are limited, it is difficult to explain this trend of variation in incidence.

Green⁴ made a general survey of the cause of damage of hairy sheep in Kenya and outlined the relative prevalence of scurf, streptothricosis, psoroptic mange, demodocosis, pox, dimple, and nodular dermatitis. He also conducted similar survey on goat skin⁵ and reported the relative occurrence of such similar defects. However, during this survey the occurrence of demodocosis in sheep skins has not been recorded so far.

Streptothricosis is very rare or of sporadic in its occurrence in Indian goat and sheep skins.

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Caprine foetal infection by demodex mange mites

Gindy¹ has demonstrated the presence of *Demodex canis* in the sections of lymphatic glands of the infested dogs, there by confirming the work of Canepa and de Grana² and Unsworth³ who have also demonstrated the presence of follicular mange mites in the lymphatic glands.

Lentz⁴ demonstrated the presence of the follicular mange mites in the lymph nodes and tongue muscle but not in the skin of a dog. In one particular dog, the author was able to demonstrate the presence of the mites in all the tissues, especially in the blood, lymph nodes, liver, spleen, kidney faeces and urine.

These lead other investigators to suspect in-utero transmission amongst dogs. However French *et al*⁵ and Greve and Gaffar⁶ have studied the mode of transmission of *Demodex canis* and concluded that prenatal transmission does not take place and suggested that infestation of the pups occur during the first few hours of life by physical contact with their infested dams. Similarly Wetzel⁷ established that the calves become infested with the mites during the first few days of life, through contact with the infested cows while being nourished and no evidence of prenatal infection was confirmed.

In Indian goat skins, the incidence of demodectosis varies from about 50-77 percent⁸, thereby deteriorating the leather making property and thus influencing a reduction in export potentiality.

Therefore, viscera of eleven caprine (Indian goat) embryos collected from the dams showing cutaneous lesions of demodectosis were examined for the presence of the mange mites.

Of the eleven foetuses examined seven of the foetal spleen and/or liver, showed the presence of the demodex mites in various stages of its life cycle; but the mites were very few in number.

Surprisingly, in two of the above positive cases, the portal vein, on examination, revealed the presence of demodex mites. The portal veins were found to be unusually engorged; a portion of such blood vessel, collected and digested with 10 per cent KOH as in the case of viscera showed large number of the follicular mange mites in all stages of its life cycle (Fig.1). This is the first report of the prenatal infection of caprine embryos (4-8 weeks old) by demodex mites, *Demodex folliculorum var caprae*/*Demodex caprae*.



Fig. 1 : Follicular mange mites from portal vein.

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