

# A STUDY ON THE PREVALENCE OF SHEEP AND GOAT SKIN DEFECTS IN BAHIR DAR TANNERY, ETHIOPIA

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**ABSTRACT:** A study to estimate the prevalence of sheep and goats skin defect was carried out at Bahir Dar Tannery. A total of 400 (200 sheep and 200 goat) sheep and goat skins were sampled and examined for skin defect at pickled stage. The study showed that there were different skin defects responsible for the decline in quality grades of skin. From the total skin examined, ekek (58.3%), scratch (22.5%), flying defect (13.8) and scar (11.3%) were common defects. For sheep skins ekek (67%), processing defect (12.5%), scratch (12%) and processing defect (8.5%) were important skin defects and only small number (8.5%) were with no defect. In goats skin, ekek (49.5%), scratch (33%), scar (17.5%) and flying defect (15%) were important defects. Skin quality grades 6 (22.3%), 5 (21.8%) and 4 (18.5%) were frequently observed skin grades. There were unappreciable numbers of rejects (12%) while quality grade 1 was the least frequent (6.3%). Ekek was significantly ( $p < 0.05$ ) higher in sheep skin (53%) than goat skin (23.5%). However; scratch was significantly ( $p < 0.05$ ) higher in goat than in sheep, but other defects were not significantly ( $p > 0.05$ ) different between the two species. Examination also showed that 26 (13.5%) and 22 (11%) were rejected in sheep and goat skins, respectively. Integrated efforts towards good animal husbandry and animal health care are very important for better quality skin. Furthermore, detailed studies on the distribution, seasonal occurrence and the direct and indirect economic impact of ectoparasites should be undertaken. Meanwhile, tanneries should collaborate with such studies to maximize the economic gain in the long run.

**Key words:** Ectoparasite, Ekek, Goat Skin, Sheep Skin, Skin Defect, Pickled Skin

## INTRODUCTION

In Ethiopia, skin from sheep and goat are valuable animal by products for local use as well for export market. In the export market, hide and skin export has got the largest share of animal products next to live animal export. Despite the reports about the deterioration of the quality of leather raw material with an increasing number of reject grades and the appearance of skin disease called ekek that is mainly due to lice, keds, and mange infestations (Abadi, 2000), Ethiopian small ruminant skins especially sheep skins have good reputation for quality in the world leather market due to their fine grain and compact structure (Zelege, 2009; Mohamed, 2000).

The leather industry sector is one of the forth growing economic sectors in Ethiopia (MoARD, 2009). However, because the sector is constrained by different factors like external parasites, inappropriate management of animals, faults during slaughtering and improper handling of skin before reaching to the tannery, the sector is losing large amount of money due to decline in quality and fall in export price (CSA, 2007). Up to 65% of the defect that lead to decline of the quality occur in the pre-slaughter stage of production while the animal still alive and a considerable portion of these pre-slaughter defects are directly associated to skin disease initiated by external parasites (Kassa et al., 1998). With this respect, detail analysis and identification of the defects that deteriorate skin quality and forwarding the corrective measures is very important in order to get the benefit out of the sector. This paper reports different skin quality defects and their prevalence in different quality grades of sheep and goats skin in Bahir Dar Tannery.

## MATERIAL AND METHODS

### Study area

The study was conducted in 2011 at Bahir Dar tannery in Bahir Dar city, Ethiopia, located at about five kilo meters south of Bahir Dar to the Blue Nile falls. Bahir Dar, capital of Amhara regional state, is found in the north

western part of Ethiopia located between 11° 36' north latitude and 37° 23' east longitude. Bahir Dar has an altitude of 1780 m a.s.l. It has an average temperature ranging from 27.9 to 13.1°C and receives a mean annual rainfall of 1434 mm (Yihalem, 2004).

The Bahir Dar Tannery was established in 1997 and has a tanning capacity of about 4000 skins per day. The tannery collects considerable number of raw materials from western part of the region. It also obtains from other parts of the country. The tannery processes hides and skins to semi-finished and finished leather for local and export markets (Solomon, 2011).

### Study design and sample size

Cross-sectional random sampling method was used for identification of skin defects in the tannery. Sheep and goat skins were taken randomly at pickled stage to identify the type of skin defect. A total of 400 (200 from sheep and 200 from Goat) pickled skins were sampled using the standard sampling method (Thursfield, 1995). Sampling was made after the skin has reached pickled stage and after it is categorized by size as extra large, large, medium and small (ESA 2008). Equal numbers of samples were taken from each size category.

After sampling, it was examined for the defects by the skin selector and graded accordingly as grade 1, grade 2, grade 3, grade 4, grade 5, grade 6 and reject (ESA, 2008) based on its overall quality (see Table 1). Skin examination was made by natural light to inspect any defect on the skins. Each skin defect identified was recorded and analysed.

Grade	Characteristics of skin
Grade 1	No or one minor visible defect which appearing with in 2.5cm from the edge are likely to depreciate the skin
Grade 2	One defect assessed to a total of 1-2 defect units appearing with in 5cm from the edges
Grade 3	Defect assessed to a total of 3-7 defect units
Grade 4	Defect assessed at more than 7 defect units appearing in not more than 20% of the total area of the skin
Grade 5	Defect assessed at more than 7 defects units appearing in not more than 50% of the total area of the skin
Grade 6	Culls of which more than 50% of the total area is usable
Reject	Culls of which more than 50% of the total area unusable

Source: Ethiopia Standard Authority (ESA) 2008

### Data management and analysis

The collected data was entered and managed in to Microsoft Excel. Descriptive statistics was used to present the data. Statistical Package for Social Sciences (SPSS, 2008) was used for data analysis. Chi-square ( $\chi^2$ ) was used to test the association of species, skin size and different grades with defects. In all the analysis, comparisons having  $p < 0.05$  were considered to have statistically significant difference.

## RESULT AND DISCUSSION

The proportion of sheep and goat skin quality grades to different sizes is presented in Table 2. From the total skins sampled, most of the sampled skins lied in grade 6 (22.3%) and grade 5 (21.8%). The proportion of extra large skins in skin quality grades 2 (3.3%), grade 3 (6.4%) and grade 1 (8%) were small. Among the rejected skins, most (58.3%) were from extra large sized skins while the least were from medium sized skins.

Size*	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Reject
Small	9(36.0)	9(30.0)	15(31.9)	17(23.0)	22(25.3)	19(21.3)	9(18.8)
Medium	8(32.0)	5(16.7)	13(27.7)	25(33.8)	25(28.7)	19(21.3)	5(10.4)
Large	6(24.0)	15(50.0)	16(34.0)	18(24.3)	23(26.4)	16(18.0)	6(12.5)
Extra large	2(8.0)	1(3.3)	3(6.4)	14(18.9)	17(19.5)	35(39.3)	28(58.3)
Total	25(6.3)	30(7.5)	47(11.8)	74(18.5)	87(21.8)	89(22.3)	48(12.0)

\*Equal number of skins was sampled from each size; Numbers in parenthesis are percentages with in a column (for each grade)

Considering the species, most of the skins from goats lied grade 6 (29.5%), grade 5 (28%) and 4 (20.5%) in their order while for sheep skins almost they were distributed almost uniformly from grade 1 to reject. The proportion of goat skins lied in grade 1 (1.5%) was small.

Species	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Reject
Sheep skin	22(88.0)	24(80.0)	34(72.3)	33(44.6)	31(35.6)	30(33.7)	26(54.2)
Goat skin	3(12.0)	6(20.0)	13(27.7)	41(55.4)	56(64.4)	59(66.3)	22(45.8)
Total	25(6.3)	30(7.5)	47(11.8)	74(18.5)	87(21.8)	89(22.3)	48(12.0)

Numbers in parenthesis are percentages with in a column (for each grade)



From the total skin examined for defects, ekek (58.3%), scratch (22.5%), flying defect (13.8) and scar (11.3%) were common defects. For sheep skins ekek (67%), processing defect (12.5%), scratch (12%) and processing defect (8.5%) were important skin defects and only small number (8.5%) were with no defect. In goats skin, ekek (49.5%), scatch (33%), scar (17.5%) and flying defect (15%) were important defects.

Ababayehu and Kibrom, (2010) reported that in sheep skins, scratch was the highest defect recorded followed by ekek and scar whereas in wet blue goat skin, scratch was frequent followed by scar and demodictic mange. The differences for the most prevalent defect might be because of the differences in the prevalence of ectoparasites in the two areas, management differences and the like.

The prevalence of ekek in the present study is higher than the report by Asp and Tauni (1988) at Awash tannery and by Ababayhu and Kibrom (2010) at Sheba tannery (40.71%) while it was lower than the report at Dessie tannery by Sertse and Wesson (2007) and at Sebeta (89%) tannery by Ermias (2000).

Ekek was significantly ( $p < 0.05$ ) higher in sheep (67%) than goat (49.5%). Cockle ("Ekek") is an allergic skin hypersensitivity reaction to Keds that occurs in local Ethiopian sheep. In Ethiopia, keds are considered a major cause of "Ekek" and are visible on the skin surface of affected animals (ESGPIP, 2009). Scratch was significantly ( $p < 0.001$ ) higher in goat than sheep. This might be associated to the browsing habit of goats where they browse in bush area which may expose them to much damage as compared to sheep. Scar was also different between the two species. Other defects were not significantly ( $p > 0.05$ ) varied between the two animals skins.

**Table 4 - Prevalence of different defects on sheep and goats pickled skin**

Defect	Sheep skin	Goat skin	Total Prevalence	X2	Pvalue
Ekek*	134(57.5)	99(42.5)	233(58.3)	5.25	0.022
Flying defect	25(45.5)	30(54.5)	55(13.8)	0.455	0.500
Ring worm	1(16.7)	5(83.3)	6(1.5)	2.667	0.102
Processing defect	17(53.1)	15(46.9)	32(8.0)	0.125	0.724
Scratch	24(26.7)	66(73.3)	90(22.5)	19.60	0.000
Scar	10(22.2)	35(77.8)	45(11.3)	13.889	0.000
Crack	0(0.0)	10(100.0)	10(2.5)	0.000	1.00
Pox	4(40.0)	6(60.0)	10(2.5)	0.400	0.527
Putrefaction	0(0.0)	6(100.0)	6(1.5)	-	-

\*Amharic word meaning itching

**Table 5 - Proportion of skin defects in different grades of skin quality**

Defect	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Reject	X2	Pvalue
Ekek*	3(12.0)	17(56.7)	34(72.3)	42(56.8)	54(62.1)	57(64.0)	26(54.2)	69.20	0.000
Flying defect	0(0.0)	4(13.3)	6(12.8)	12(16.2)	16(18.4)	13(14.6)	4(8.3)	14.49	0.013
Ring worm	0(0.0)	0(0.0)	0(0.0)	4(5.4)	1(1.1)	0(0.0)	1(2.1)	3.00	0.223
Processing defect	0(0.0)	3(10.0)	1(2.1)	7(9.5)	10(11.5)	6(6.7)	5(10.4)	9.25	0.099
Scratch	0(0.0)	4(13.3)	8(17.0)	15(20.3)	21(24.1)	30(33.7)	12(25.0)	29.33	0.000
Scar	0(0.0)	2(6.7)	4(8.5)	6(8.1)	8(9.2)	19(21.3)	6(12.5)	23.93	0.000
Crack	0(0.0)	0(0.0)	2(4.3)	4(5.4)	3(3.4)	1(1.1)	0(0.0)	2.00	0.572
Pox	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(1.1)	9(18.8)	6.40	0.011
Putrification	0(0.0)	1(3.3)	1(2.1)	1(1.4)	1(1.1)	1(1.1)	1(2.1)	0.00	1.00
Total	25(6.3)	30(7.5)	47(11.8)	74(18.5)	87(21.8)	89(22.3)	48(12)		

\*Amharic word meaning itching

**Table 6 - Proportion (%) of skin defects in different size categories of sheep and goat skins**

Defect	Small	Medium	Large	Extra large	Total	X2	P value
Ekek*	57(57.0)	57(57.0)	61(61.0)	58(58.0)	233(58.3)	0.185	0.98
Flying defect	8(8.0)	7(7.0)	25(25.0)	15(15.0)	55(13.8)	15.036	0.002
Ring worm	1(1.0)	4(4.0)	1(1.0)	0(0.0)	6(1.5)	3.00	0.233
Processing defect	14(14.0)	13(13.0)	3(3.0)	2(2.0)	32(8.0)	15.25	0.002
Scratch	17(17.0)	28(28.0)	14(14.0)	31(31.0)	90(22.5)	9.111	0.028
Scar	7(7.0)	11(11.0)	10(10.0)	17(17.0)	45(11.3)	4.689	0.196
Crack	5(5.0)	0(0.0)	0(0.0)	5(5.0)	10(2.5)	-	-
Pox	0(0.0)	1(1.0)	4(4.0)	5(5.0)	10(2.5)	2.60	0.273
Putrefaction	1(1.0)	4(4.0)	1(1.0)	0(0.0)	6(1.5)	3.00	0.223

\*Amharic word meaning itching

The proportion of skin defects in different quality grades is presented in table 5. Ekek was most important in all quality grades especially in quality grade 6 (64%), grade 5 (62.1%) and grade 4 (56.8%). The most important defects in rejected skins were ekek (54.2%), scratch (25%) and pox (18.8%). Next to ekek, scratch (33.7%) and scar (21%) were important skin defects in skin quality grade 6 while flying defect is the third prevalent in skin quality grades 5 and 4.

Negussie et al. (2011) reported that out of the rejected skins from goats and sheep, 98.8% of them had ekek and scratch, whereas 85.6% of them contained sheep and goat pox and 52.2% of them were having knife cuts.



However, Asp and Tauni (1988) indicated that ekek is the third most important skin rejection defect next to scratch and technical defects at Awash tannery. The differences in the importance of the various skins defects for the rejection could be due to differences in the epidemiology of ectoparasites and differences in skin processing in various tanneries.

Considering skin defects with respect to skin sizes, ekek was important in all the sizes followed by scratch for small (17%), medium (28%) and extra large (31%) sized skins, and flying defect for large sized skins. Processing defect in small and medium sized skins and scar for large and extra large sized skins were also important.

## CONCLUSION AND RECOMMENDATION

The result showed that different skin quality defects are responsible for the decline in quality grades which ultimately determines the benefit from the sector. These defects were both manmade (flying defect, post flying handling of the skin, branding) and biological (external parasites and skin diseases). Therefore, awareness creation for the producers about the effect of skin defect on the revenue from the skin is very important. Control of ectoparasite through combination rotational grazing, sound husbandry practice, and application of insecticide and acaricide should be encouraged to minimize the effect of ectoparasites.

In general, integrated efforts towards good animal husbandry and animal health care are very important. Furthermore, detailed studies on the distribution, seasonal occurrence and the direct and indirect economic impact of ectoparasites should be undertaken. Meanwhile, tanneries should collaborate with such studies to maximize the economic gain in the long run.

## ACKNOWLEDGMENTS

The authors are grateful for Bahir Dar skin tannery and the personnel's working in the tannery for their technical support.

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