Peri and Post Slaughter Defect Assessment of Sheep and Goat Skin in Selected Districts of Borana Zone, Oromia Region, Ethiopia

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Abstract
A cross-sectional study was employed to assess peri and post slaughter defect of sheep and goat skin in selected districts of Borana Zone. Two districts (Dire and Yabelo) were purposively selected based on livestock population and accessibility of sheep and goat skins supply. A total of 1440 skins (960 goat and 480 sheep skins) were randomly selected to assess the observable defects using close observation. Both sheep and goat skins were graded according to the standard set by Ethiopian Quality and Standard Authority. All the examined skin had one or more types of defects. The major defects observed on fresh goat's skin were poor pattern (38.83%), dirt (36.66%) and flay cut (33.83%). In wet salted goat skin the dominant defects were poor pattern (32.22%), dirt (28.88%) and flay cut (26.66%). Whereas, in fresh sheep skins a higher prevalence of defects were poor pattern (36.66%), dirt (31.94%) and corduroying (30.83%). In wet salted sheep skin the higher prevalence defects were poor pattern (50.83%), dirt (44.16%) and corduroying (28.33%). The grading of the fresh goat skins according to their rank was Grade II (40.83%), Grade I (31.33%) and Grade III (21.33%) were 1st, 2nd and 3rd rank, respectively. The grading of the wet salted goat skins according to their rank was Grade II (40.27%), Grade I (30.27%) and Grade III (21.94%) were 1st, 2nd and 3rd rank, respectively. The grading of the fresh sheep skins according to their rank was Grade II (40.55%), Grade I (26.66%) and Grade III (20.55%) were 1st, 2nd and 3rd rank, respectively. The grading of the wet salted sheep skins according to their rank was Grade II (42.5%), Grade I (31.66%) and Grade III (13.33%) were 1st, 2nd and 3rd rank, respectively. This indicates that most defects on skins occurred during and after slaughtering operations. Therefore, more attention should be taken during and after slaughtering of animals to get quality skins for national as well as international market, and maximize the country's foreign currency exchange.
Keywords: Defect, Fresh, Salted, skin, peri and post slaughtering
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1. INTRODUCTION
In majority of developing countries, despite the fact that they have enormous livestock population, their contribution to growing supplies of hide and skin on the world market is very unreasonable (FAO, 2009). This reason is also true for Ethiopia that possesses huge livestock resources which account 59.5 million cattle, 30.7 million sheep, 30.2 million goats, 1.21 million camels, 59.53 million poultry, 2.16 million horses, 0.41 million mules and 8.44 million donkeys (CSA,2017). Based on annual off take rates of cattle 7.12%, sheep, 31.11% and goats, 35.37%, the potential production is estimated at 3.7 million cattle hides, 8.7 million sheep skins and 8.1 million goat skins in 2011/2012 (FAO, 2011). Hides and skins are the most valuable export item for the country other than coffee (ECBP, 2009), with export earnings for the country was US$895, 04,000 in 2014 (Wegeyehu, 2016). The leather industry is one of the fastest-growing economic sectors in Ethiopia (Bayou, 2007).

Hides and skins are the basic raw materials for the leather industry. There are 32 tanneries converting hides and skins to different types of finished leather. There is a possibility of producing up to 500 million square feet of finished leather per year. This industry relatively, having a better position due to mature in its age and huge investment (LIDI, 2017). The capacity to process hides and skins, particularly for raw sheep and goat skins

greatly exceeds domestic supply. These tanneries have an average daily soaking capacity of 107,850 pieces of sheep skin, 51,550 pieces of goat skin and 9,800 hide (USAID, 2013). However, they are not working to full capacity, because the availability and the potential supply of hide and skins depend on the scale of meat production, not on the size of livestock population (Bisrat, 2013). The industry in the country has tremendous potential for domestic and foreign exchange earnings and the capacity to attract profitable foreign investment. Ethiopia had very good potential to produce substantial quantities of hide and skins over the last 10 years; however there are indications that quality of raw hide and skins supplied has been deteriorating with an increasing number of poor grades (Bisrat, 2013). The main problems contributing to downgrading hides and skins can be generally categorized as natural and man-made defects (Zenaw and Mekonnen, 2012). For instance-inappropriate management of animals, faults during slaughtering and improper handling of skin and hide before it reached at tannery also contributed for downgrading the quality (Abadi, 2000). This has resulted in an ever increasing number of complaints about the quality of hides and skins available to market. According to (Little *et al*., 2010) about 25% of tradable hides and skins originate from pastoral areas, with most of these coming as by-products from slaughter houses, but rendered poor due to inadequate animal nutrition, infectious animal diseases and mechanically caused defects. Due to this reason, hides and skins contribute only 1 to 2 % of the household income in pastoral areas (Little *et al*., 2010).

Borana Zone is one of the pastoral areas of Oromia Region which has high potential livestock population. Hides and skins are important livestock products providing income for the poor people living in the rural areas of the region. Hides and skins are still given little consideration to the care required for collection, preservation and processing to the high-quality leather (Adugna, 2004). Studies on peri and post slaughter defect assessment of sheep and goat skin have not been conducted so far in Borana Zone. However, information is needed on peri and post slaughter defect assessment of sheep and goat skin to take any remedial measures. Therefore, this study was conducted to assess peri and post slaughter defect of sheep and goat skin in selected districts of Borana Zone with the following objectives.

General Objective
➢ To assess peri and Post Slaughter Defects of Sheep and Goat Skin in Selected Districts of Borana Zone, Oromia Region, Ethiopia

Specific Objective
➢ To assess peri Slaughter Defects of Sheep and Goat Skin in selected districts of Borana Zone
➢ To assess Post Slaughter Defects of Sheep and Goat Skin in selected districts of Borana Zone
➢ To evaluate the quality of Sheep and Goat skin in selected districts of Borana Zone

2. MATERIALS AND METHODS
2.1. Description of the Study Area
This study was conducted in Borena Zone. It is one of 21 Administrative Zones of Oromia Regional State, Ethiopia. The Zone is situated between $3^0 36'$- $6^0 38'$ North latitude and $3^0 43'$–$39^0 30'$ East longitude. The altitude of the Zone ranges between 1000 m to 2400 m above sea level. Average of annual rainfall 238 mm to 896 mm, mean daily air temperatures ranging between 19°C and 29°C (Zewdie *et al*., 2015). Livestock populations of Borana Zone are 1,056,040 cattle, 868,571 goats, 573,369 sheep, 51,607 camels, 1,096 horses, 3,149 mules, 490,717 poultry and 64,699 beehives (CSA, 2017). Yabelo and Dire were selected among districts of Borana Zone based on livestock population and accessibility of hide and skin supply.

Yabelo
Yabelo is one of the districts in the Borana Zone of Oromia Regional State. It is the capital city of the Zone, which is located between latitude $4^0 30'55.81''$ and $5^0 24'36.39''$N and longitude $37^0 44'14.7''$ and $38^0 36'05.35''$ E. It is located 570 km south of capital city /Addis Ababa/ (Dessalengn, 2009).The altitude of this district ranges from 350 to 1800 meters above sea level. About 70% of the farmers are pastoralists. Livestock populations of the district are 115,600 cattle, 100,179 goats, 43,591 sheep, 19,505 camels and 5,571 equines (Yabelo district Agricultural Office 2017). It has a bimodal rainfall pattern in which 65% of the rainfall local called *Gannaa* is received in April-June and the other 35% local called *Hagayaa* in September-November. The district is endowed with savannah type vegetation suitable mainly for cattle. Land degradation including soil erosion and bush encroachment is severe in the district. Pastoralist and agro pastoralist are the dominant forms of livelihood pursued by the rural people (Solomon *et al*., 2008).

DIRE
Dire is one of the 13 districts of Borana Zone and located in the Southern part of the Zone on the way to Moyale. The district is found at a distance of 100 km from Zone Capital Yabelo and 670 km from Addis Ababa in South direction. The livestock population in the district was 175,006 cattle, 128,714 goats, 86,820 sheep, 8678 camels, 7454 equines (Dire district Agricultural Office 2017). The district has bimodal rainfall pattern with average rainfall of 450-500mm, the district is located at $4^0 01'$N and $38^0 15'$E. The average temperature ranges from 16 to 27^0c. The altitude of the district varies from 1320 to 2495 meter above sea level (m.a.s.l) (Abarufa, 2011).

2.2. Defect assessment and grading of skins
2.2.1. Defect assessment of skins
A cross-sectional study was employed to assess peri and post slaughter defect of sheep and goat skin in selected districts of Borana Zone. Defect assessments were done in randomly selected 600 fresh goat skins, 360 wet salted goat skins, 360 fresh sheep skins and 120 wet salted sheep skins by using close observation both in hair and flesh sides. During that time, all observable manmade defects were examined like hole/flay cut, poor pattern, gouge mark, corduroying/siding, putrefaction, filthiness/dirt and salt spots. A defect of skins was done by assessed defects on it and given based on the defect units as shown below in Table 1.

Table 1. Criterion for assessment of sheep and goat skins defects.

s/n	Defects	Defect unite allocated
1	Hand hole, hole or holes caused by beetles each	2
2	Weak spot, gouge or gash or channels caused by beetles each	1
3	Poor pattern	2
4	Siding or corduroying per side	1
5	Edge soiled with urine or dung	2
6	Heating or grain damage per average area of 10×15 cm	2
7	Salt spots red or purple spots per average area of 30×30 cm	2
	Total	12

2.2.2. Grading of skins
Grading based on defect units was done by using "the standard set by the Ethiopian Quality and Standard Authority" (MOA, 1986; Dervacy and Getachew, 1988). Based on the number of defect units, the grade of the skins was determined as shown below in Table 2.

Table 2. Grading description for sheep and goat skins.

Origin of skin	grade by appearance	Characteristics
	Grade 1	No visible defects which are likely to depreciate the skin appearing beyond 5 cm from the edge
	Grade 2	Defects assessed to a total of 1-3 defect units
Sheep and Goats	Grade 3	Defects assessed to a total of 4-8 defect units
	Grade 4	Defects assessed at a total of more than 8 defect units, the unusable area being at the most equal to 50%of the total area
	Reject	Skins of which more than 50% of the area is unusable

2.3. Data Management and Analysis
The data were managed and fed into Microsoft Excel and analyzed using SPSS (Version 20, 2012) software. Descriptive statistics such as, means, frequency, standard deviation and percentages were analyzed and presented by tables.. The analysis of variance (ANOVA) was conducted to test each defect in selected districts. A significant mean difference was declared by using Tukey-Kramer HSD procedure.

3. RESULTS AND DISCUSSION
3.1. Observable Defects and Grading of Goat Skins in Warehouse
3.1.1. Defects of fresh goat skins
The defect of fresh goat skins is presented in Table 3. The leading overall defect of fresh goat skins was poor pattern (38.83%), dirt (36.66%) and flay cut (33.83%). The result disagrees with the report of Zembaba *et al*, (2013) who reported that dirt (37.62%), poor pattern (28.05%), and corduroying (14.11%) were the main defects of fresh goat skins. This result was disagree with the report of Selamawit (2015) who reported that flesh remnant (78.9%), dirt (68.4%) and blood (38.8%) were the main defects of the fresh goat skins. The current result was also not supported by the report of Behailu *et al*, (2017) flay cut/hole (16.4%), corduroying (13.8%) and flesh remnant (10.7%) were the main defects of raw goat skins.

Table3. Defects of fresh goat skins

	Study districts		
	Dire	Yabelo	Over all
Defects	N (%)	N (%)	N (%)
Flay cut	167(55.66)	36(12)	203(33.83)
Poor pattern	139(46.33)	94(31.33)	233(38.83)
Gouge mark	56(18.66)	50(16.66)	106(17.66)
Corduroying	67(22.33)	78(26)	145(24.16)
Dirt	123(41)	97(32.33)	220(36.66)

As shown in Table 4, in both districts flay cut, poor pattern and dirt has shown a significant ($P<0.05$). The mean of defect in Dire district was higher than of Yabelo district. This shows that the producers of goat skins in Yabelo district have good understanding about the skins defects as compared to Dire district.

Table 4. Mean defects per fresh goat skins

Defect	Study districts			
	Dire	Yabelo	SEM	p-value
Flay cut	0.56[a]	0.12[b]	0.019	<0.001
Poor pattern	0.46[a]	0.31[b]	0.040	<0.001
Gouge mark	0.18	0.16	0.047	0.522
Corduroying	0.22	0.26	0.070	0.295
Dirt	0.41[a]	0.32[b]	0.117	0.006

Means with a different superscript in a row are significantly different ($P< 0.05$).

3.1.2. Grading of fresh goat skins

The grading of fresh goat skins is presented in Table 5. A total of 600 skins were graded based on the observable defects. The overall grading of the fresh goat skins according to their rank was Grade II (40.83%) the first rank, Grade I (31.33%) the second rank, Grade III (21.33%) the third rank, grade IV (6%) the forth rank and reject (0.5%). This result disagrees with the report of Zembaba et al, (2013) who reported that Grade III was the first rank (35.42%), Grade II was the second rank (29.33%) and Grade I was the third rank (23.2%) of fresh goat skin.

Table 5. Grading of fresh goat skins

	Study districts		
	Dire	Yabelo	Over all
Grade	N (%)	N (%)	N (%)
I	83(27.66)	105(35)	188(31.33)
II	118(39.33)	127(42.33)	245(40.83)
III	60(20)	68(22.66)	128(21.33)
IV	36(12)	0(0.0)	36(6)
Reject	3(1)	0(0.0)	3(0.5)
Total	300(100)	300(100)	600(100)

3.1.3. Defects of wet salted goat skins

The number of wet salted goat skin defects in the study area is presented in Table 6. The leading overall defect of wet salted goat skins was poor pattern (32.22%), dirt (28.88%) and flay cut (26.66%). This result was nearly similar with the report of Zembaba et al, (2013) who reported that poor pattern (29.16%), dirt (26.89%) and corduroying (22%) were the main defects of salted goat skin. The result disagreed with the report of Melkamu, (2014) the leading overall defects of wet salted goat skins were filthiness (28.3%), poor pattern (18.3%) and flay cut (15.6%). The disagreed report was noted by Selamawit (2015), flesh remnant (65.1%), dirt (57.9%) and poor pattern (23%) were the main defects of the salted goat skins.

Table 6. Defects of wet salted goat skins

	Study districts		
	Dire	Yabelo	Over all
Defects	N (%)	N (%)	N (%)
Flay cut	75(41.66)	21(11.66)	96(26.66)
Poor pattern	72(40)	44(24.44)	116(32.22)
Gouge mark	41(22.77)	29(16.11)	70(19.44)
Corduroying	45(25)	28(15.55)	73(20.27)
Putrefaction	53(29.44)	35(19.44)	88(24.44)
Dirt	54(30)	50(27.77)	104(28.88)
Salt spot	35(19.44)	27(15)	62(17.22)

The significant difference ($P<0.05$) were observed between two districts in flay cut, poor pattern,

corduroying and putrefaction Table 7. The mean defects of Dire were higher than of Yabelo district. This shows that Dire district had not a good understanding about the defects which lessens the quality of skin compared with Yabelo district.

Table 7. Mean defects per wet salted goat skins

Defect	Study districts		SEM	P-value
	Dire	Yabelo		
Flay cut	0.42[a]	0.12[b]	0.023	<0.001
Poor pattern	0.4[a]	0.24[b]	0.049	0.002
Gouge mark	0.22	0.16	0.063	0.111
Corduroying	0.25[a]	0.16[b]	0.085	0.026
Putrefaction	0.29[a]	0.19[b]	0.113	0.027
Dirt	0.3	0.27	0.144	0.643
Salt spot	0.19	0.15	0.139	0.265

Means with a different superscript in a row are significantly different (P< 0.05).

3.1.4. Grading of wet salted goat skins

The grading of the wet salted goat skins is presented in Table 8. A total of 360 skins were graded based on the observable defects. The overall grading of the wet salted goat skin according to their rank was Grade II (40.27%) the first rank, Grade I (30.27%) the second rank, Grade III (21.94%) the third rank, grade IV (7.22%) the forth rank and reject (0.27%). This result agreed with the report of Zembaba et al, (2013) who reported that Grade II was the first rank (34.34%), Grade I was the second rank (29.63%) and Grade III was the third rank (27.59%) of salted goat skins. It also agreed with Melkamu (2014) the overall grading of the salted goat skins according to their rank was Grade II (54.4%) as the first rank, Grade I (31.4%) as the second, and Grade III (14%) as the third rank. In the current study there were the rejected wet salted goat skins, this is due to lack of improper preservation and storage place in the study areas.

Table 8. Grading of wet salted goat skins

	Study districts		Over all
	Dire	Yabelo	
Grade	N (%)	N (%)	N (%)
I	47(26.11)	62(34.44)	109(30.27)
II	74(41.11)	71(39.44)	145(40.27)
III	33(18.33)	46(25.55)	79(21.94)
IV	25(13.88)	1(0.55)	26(7.22)
Reject	1(0.55)	0(0.0)	1(0.27)
Total	180(100)	180(100)	360(100)

3.2. Observable Defects and Grading of Sheep Skins in Warehouse
3.2.1. Defects of fresh sheep skins

Defects of fresh sheep skin are presented in Table 9. The leading overall defect of fresh sheep skins were poor pattern (36.66%), dirt (31.94%) and corduroying (30.83%). The result was disagree with the report of Zembaba et al, (2013) dirt (40%), poor pattern (26.93%) and corduroying (17%) were the main defects of fresh sheep skins. The result disagreed with the report of Melkamu (2014) the filthiness (22%), poor pattern (14.2%) and gouge mark (9.8%) were the leading defects of raw sheep skin. This result also disagreed with the report of Selamawit (2015) who reported that flesh remnant (79.6%), dirt (65.5%) and blood (31.1%) were the main defects of the fresh sheep skins. According to the Behailu et al, (2017) flay cut/hole (31.4%), flesh remnant (17.5%) and corduroying (16.8%) were the main defects of raw sheep skins.

Table 9. Defects of fresh sheep skins

	Study districts		Over all
	Dire	Yabelo	
Defects	N (%)	N (%)	N (%)
Flay cut	51(28.33)	48(26.66)	99(27.5)
Poor pattern	72(40)	60(33.33)	132(36.66)
Gouge mark	31(17.22)	22(12.22)	53(14.72)
Corduroying	68(37.77)	43(23.88)	111(30.83)
Dirt	42(23.33)	73(40.55)	115(31.94)

In this study, corduroying and dirt on raw sheep skin have shown a significant difference (P<0.05) in both districts Table 10. The mean defect of corduroying in Dire was higher than of Yabelo and the mean defect of dirt was higher in Yabelo than Dire district.

Table 10. Mean defects per fresh sheep skins

Defects	Study district		SEM	P-value
	Dire	Yabelo		
Flay cut	0.28	0.27	0.024	0.724
Poor pattern	0.4	0.33	0.051	0.190
Gouge mark	0.17	0.12	0.056	0.182
Corduroying	0.37[a]	0.24[b]	0.097	0.004
Dirt	0.23[b]	0.41[a]	0.148	<0.001

Means with a different superscript in a row are significantly different (P< 0.05).

3.2.2. Grading of fresh sheep skins

The grading of the fresh sheep skins is presented in Table 11. A total of 360 skins were graded based on the observable defects. The overall grading of the fresh sheep skins according to their rank was Grade II (40.55%) the first rank, Grade I (26.66%) the second rank, Grade III (20.55%) the third rank, grade IV (11.66%) the fourth rank and reject (0.55%). This result agreed with report of Melkamu (2014) the overall grading of the sheep skin according to their rank was Grade II (61.33%) the first rank, Grade I (33.33%) the second and Grade III (5.33%) the third rank. This result was different from Zembaba et al, (2013) Grade II was the first rank (32.13%), Grade III was the second rank (28.41%) and Grade I was the third rank (21.6%) of fresh sheep skins. In the current study fourth grade and rejects on fresh sheep skin were observed, this might be due to lack of awareness and use of improper ripping and flaying knives during slaughtering.

Table 11. Grading of fresh sheep skins

Grade	Study districts		Over all
	Dire	Yabelo	
	N (%)	N (%)	N (%)
I	52(28.88)	44(24.44)	96(26.66)
II	78(43.33)	68(37.77)	146(40.55)
III	26(14.44)	48(26.66)	74(20.55)
IV	23(12.77)	19(10.55)	42(11.66)
Reject	1(0.55)	1(0.55)	2(0.55)
Total	180(100)	180(100)	360(100)

3.2.3. Defects of wet salted sheep skins

Defects of wet salted sheep skin are presented in Table 12. The leading overall defect of wet salted sheep skins was poor pattern (50.83%), dirt (44.16%) and corduroying (28.33%). This result agreed with the report of Zembaba et al, (2013) poor pattern (29.16%), dirt (26.89%) and corduroying (22%) were the main defects of salted sheep skins. This result also disagreed with the report of Selamawit (2015) the major salted sheep skin defects were flesh remnant (69%), dirt (52.8%) and poor pattern (19%).

Table 12. Defects of wet salted sheep skins

Defects	Study districts		Over all
	Dire	Yabelo	
	N (%)	N (%)	N (%)
Flay cut	12(20)	16(26.66)	28(23.33)
Poor pattern	27(45)	34(56.66)	61(50.83)
Gouge mark	8(13.3)	12(20)	20(16.66)
Corduroying	13(21.66)	21(35)	34(28.33)
Putrefaction	15(25)	16(26.66)	31(25.83)
Dirt	26(43.33)	27(45)	53(44.16)
Salt spot	15(25)	12(20)	27(22.5)

There was no any significant difference (P>0.05) on the mean observable defects in both districts of the study area Table 13.

Table 13. Mean defect per wet salted sheep skins

Defects	Study district		SEM	P-value
	Dire	Yabelo		
Flay cut	0.20	0.27	0.039	0.392
Poor pattern	0.45	0.56	0.092	0.204
Gouge mark	0.13	0.20	0.102	0.331
Corduroying	0.21	0.35	0.165	0.107
Putrefaction	0.25	0.26	0.201	0.836
Dirt	0.43	0.45	0.273	0.856
Salt spot	0.25	0.20	0.268	0.516

3.2.4. Grading of wet salted sheep skins

The grading of the wet salted sheep skins is presented in Table 14. A total of 120 skins were graded based on the observable defects. The overall grading of the wet salted sheep skins according to their rank was Grade II (42.5%) the first rank, Grade I (31.66%) the second rank, Grade III (13.33%) the third rank, grade IV (11.66%) the forth rank and reject (0.83%). This result was similar with the report of Zembaba *et al*, (2013) Grade II was the first rank (36.33%), Grade I was the second rank (29.68%) and Grade III was the third rank (28.14%) of salted sheep skins.

Table 14. Grading of wet salted sheep skins

	Study districts		
	Dire	Yabelo	Over all
Grade	N (%)	N (%)	N (%)
I	24(40)	14(23.33)	38(31.66)
II	22(36.66)	29(48.33)	51(42.5)
III	6(10)	10(16.66)	16(13.33)
IV	8(13.33)	6(10)	14(11.66)
Reject	0(0.0)	1(1.66)	1(0.83)
Total	60(100)	60(100)	120(100)

4. CONCLUSIONS

The result of this study revealed that the leading defects fresh goat's skins were poor pattern, dirt and flay cut. In wet salted goat skins the dominant defects were poor pattern, dirt and flay cut. Whereas, a higher prevalence of poor pattern was observed in fresh sheep skins followed by dirt and corduroying. In wet salted sheep skins the higher prevalence defects were poor pattern, dirt and corduroying. The grading of the fresh goat skins according to their rank was Grade II, Grade I and Grade III were 1st, 2nd and 3rd rank, respectively. The grading of the wet salted goat skins according to their rank was Grade II, Grade I and Grade III were 1st, 2nd and 3rd rank, respectively. The grading of the fresh sheep skins according to their rank was Grade II, Grade I and Grade III were 1st, 2nd and 3rd rank, respectively. The grading of the wet salted sheep skins according to their rank was Grade II, Grade I and Grade III were 1st, 2nd and 3rd rank, respectively. Very few skins were grouped in Grade IV and there were no reject hides and skins during this study. It is not realistic to expect animal hides or skins to be perfect and defects are almost always present to some extent. Such defects cause depreciation in the value of the hides and skins and the consequence is that farmers, traders and the tanning industry suffer considerable financial losses.

5. RECOMMENDATIONS

Therefore from this study, the following recommendations should be undertaken to improve hide and skin quality in the study area:

➢ Constructing of slaughtering houses and using of wet salting preservation methods in Borena Zone is strongly needed to improve the quality of hides and skins

➢ The storage room/warehouses/ of the skin shall be constructed according to the standard set by Ministry of Agriculture (MoA) and should be supervised regularly by the responsible experts assigned in the districts.

➢ Additionally grading of raw skins should be practiced and the price must be fixed based on its grade.

➢ Awareness creation programs on peri and post slaughtering defects through extension service is very crucial to improve the quality of hide and skin for maximizing income.

6. ACKNOWLEDGMENTS

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