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THE QUALITY OF LOCAL SHEEP SKIN AND LEATHER WITH DIFFERENT DRYING METHODS

Yamin, M.[1], Raharjo Y.C.[2]

Abstract

Leather processing manufacture is a fast growing industry and has become an export commodity in Indonesia. The technology of leather processing in the manufacture has been well developed, however the quality of processed leather still varies, depends on the quality of preserved skin/hide itself (commonly salt preservation). Drying method has not widely used, although in fact this technique can be quite cheaper and easier for tropical condition. This experiment aims to study the effect of drying method using sunshine, fan and AC (air-conditioner) on physical quality of dried skin and leather of female local sheep (1-2 years old). The results shows that the average of water contents of skins were 23.9%, 26.6% and 25.6%, respectively for sun, fan and AC drying. The water contents dropped from around 65% to the lowest level after day 1, 2 and 3 for the treatments. In terms of physical quality, the tensile strength and elasticity of finished leather were 264.21 kg/cm2 and 65.3% for sunshine treatment; 346.2 kg/cm^2 and 63% for fan drying and 386.9 kg/cm^2 and 65.33% for AC method. Both physical parameters were significantly similar between treatments (P>0.05). It is concluded that drying technique using the three methods were all decreased water content as required (10-16 %). With similar tensile strength and elasticity between drying treatments, the three drying technologies can be considered as a preservation technique, but with a consideration of cost and skill to use the technologies.

Key words: Sheep, Skin, Leather, Drying, Quality

Introduction

Leather processing manufacture has become a fast growing industry either for domestic needs or as an export commodity. The technology of leather processing has been well developed, however the quality of preserved skin still varies that may cause price penalties on poor quality of the skin. This might be caused by the technique of skin preservation itself. Preservation is applied to protect the skin from the damage or rotten condition caused by microorganisms. Salt is a more commonly used in the preservation of sheep skin than the other techniques such as drying

[1] Faculty of Animal Sci, Bogor Agricultural University, Darmaga, Bogor 16680. Indonesia. E-mail: mohamadyamin@yahoo.com
[2] Research Institute for Animal Production, PO BOX 221 Bogor 16002 Indonesia.

methods which may be in fact more cheaper and easier for tropical condition. However, drying technique using sunshine is relatively difficult to control and skin can easily be contaminated, needs large area and may cause collagen / albumin / globulin denaturation, fat absorption into corium causing boatiness and can cause dark colour in finished leather (Judoamidjojo, 1981). Therefore this current study was designed to test the hypothesis that other drying techniques using fan and AC can produce better sheep skin/leather quality and more efficient method than the sunshine drying technique.

Materials and Methods

Experimental Animals

Nine fresh sheep skin of 1-2 year old of local sheep obtained from sheep skin collectors in Cicurug markets, West Java, were used for three drying treatments (drying under sunshine, with fan and AC) with 3 animals per treatment as replications.

Drying Techniques

Drying under sunshine were applied by drying the skin under sunshine with the slope around 45-60°C from ground with subcutaneous parts were facing to the sun and directed to North – South, from 08.00-11.00 and 13.00-15.00, in each day, meanwhile they were dried inside open sided shed between 11.00-13.00.

In drying with fan (ventilating fan, type 50 AEQ, Matsushita Seiko, co, Ltd. Japan), skins were accessed to the wind from the fan blow with the skin position was parallel to the fan. In AC treatment skins were kept in a room equipped with two AC (Eolia National and Daicool WK15CVI) with the temperature around 16-20°C.

All drying treatment was conducted for 5 days and the skin water content was analysed 2-3 times every day during that period. Temperature and relative humidity surrounding the experimental site of all treatments were recorded.

Leather Processing

The skins were further processed to be finished leather. The methods used for processing the leather were as applied by BBKKP (*Balai Besar Kulit, Karet dan Plastik*) Yogyakarta (1989). In brief, the processing stages were soaking, bating, fleshing, pickling, tanning, neutralizing, fat liquoring, retaining, drying, stacking and buffing.

The physical qualities observed in finished leather were tensile strength and elasticity (SNI 06-1795-1990).

Data Analysis

Data were analysed with Completely Randomised Designed (CRD) with one way analysis of variance with three replications for each treatment (drying with sunshine, fan or AC). Significant results were further analysed with Duncan test (Steel and Torrie, 1995).

Results and Discussion

Data of Temperature and Relative Humidity

Table 1 shows the temperature and relative humidity recorded during the experiment in three different drying methods. In overall, the average temperature and RH in sunshine, fan and AC drying methods were respectively 29.1 ^{0}C and 56.9%; 26.2 ^{0}C and 68.5%; 19.8 ^{0}C and 57.6%. Desrosier (1988) reported that higher air temperature and lower relative humidity increased evaporation of materials causing a faster drying process. This is the case in the current results that drying using sunshine takes shorter drying period than by using fan or AC.

Table 1. Data on temperature and relative humidity during drying process

Day	Sun-shine drying						Fan drying				AC drying			
	Temperature ^{0}C			Rh (%)			Temperature ^{0}C		Rh (%)		Temperature ^{0}C		Rh (%)	
	8-11	11-13	13-15	8-11	11-13	13-15	8-12	12-15	8-12	12-15	8-12	12-15	8-12	12-15
0	29	*	22	*	*	*	26	24	*	*	20	*	56	*
1	37	27	33	*	67	*	26	27	*	*	19	20	60	59
2	31	27	31	65	63	65	25	27	71	*	22	20	58	56
3	31	26	31	75	50	45	25	29	82	60	19	20	58	56
4	*	26	27		60	72	26	27	60	72	19	19	56	*
5	*	*	*	*	*	*	*	*	*	*	20	19	60	58

* Not recorded

Water Content of Dried Skin

Water contents in dried skin under three different drying techniques are shown in table 2. In a pooled data, drying methods were significantly affected the water content of dried sheep skins ($P<0.05$). Water content in skin from sun drying process was significantly lower (23.9%) than fan drying (26.6%) ($P<0.05$), however no significant difference in water content were found between sun and AC drying (25.6 %,) or between fan and AC drying ($P>0.05$).

The water content of skin under sun drying method was significantly decreased immediately at day-1 ($P<0.05$), whereas in fan and AC drying techniques, the decrease in water content were significantly occurred at day 2 and day 3,

respectively (P<0.05) (Table 2). In more detail based on observation days, at day 1, skin under all drying methods had similar water content, however, at day-2 and 3 sun drying produced the lowest water content in skin followed by AC and fan drying (P<0.05). At day 4, the water content was similar in skins under AC and fan drying treatments, and at day 5, under sun and AC drying, the water content in skin was similar.

Table 2. Effect of drying methods on water content in dried skins for 5 days observations

Day	Drying Method		
	Sun-shine	Fan	Air-conditioner (AC)
0	71.14±0.88	66.18±2.34	70.38±2.25
1	20.26±2.36	22.70±4.39	20.87±6.06
2	12.13±1.05	20.78±0.58	16.25±0.29
3	12.30±0.41	17.34±0.39	15.57±0.13
4	12.93±0.84	16.67±1.12	15.66±0.45
5	14.79±0.31	16.01±0.80	14.78±0.32

As discussed earlier, temperature and humidity can affect drying length. However in the current results, relative humidity seems more dominant in affecting the drying length than temperature. Similar water content in sun and AC might be related to similar Rh between both treatments and the water content was not affected by different temperature between sun and AC drying methods (29.1 ^{0}C and 19.8 ^{0}C).

Although water content in dried skin based on SNI has not been recommended yet, however, the current results were according to the work by Aten *et al.* (1955) and Fahidin (1973) that skin drying decreased the skin water content from 65% to be around 10-15%, depends on skin type and condition, relative humidity. However, the water content of skin under fan drying is still relatively higher than suggested (16.01%) and took longer to dry. Slow drying process can cause skin is easily rotten / damage because microorganism can easily alive in skin with high water content (wet/fresh skin) as discussed earlier.

Physical Quality of Leather

Table 3 shows the physical quality in tensile strength between the treatments and the result show that the strength was similar between treatments (P>0.05). Similarly elasticity of finished leather was similar between treatments (Table 4, P>0.05). Non-significant results in both physical qualities may be related to high standard errors (more than 20%) that can be a result of variation between individual in terms of their age, body weight or management practices. However, the physical quality in both parameters found in the present results is according to that minimally required by SNI, 120 kg/cm2 (SNI 06-4593-1998) and maximal requirement of 70% (SNI 06-0234-1989), respectively for tensile strength and elasticity.

Table 3. Mean tensile strength and elasticity of finished leather In different drying treatments

Drying Treatment	Tensile Strength (kg/cm^2)	Elasticity (%)
Sun-shine	264.21±118.26[a]	65.33±6.11[a]
Fan	346.20±101.01[a]	63.00±40.36[a]
AC	386.92±65.02[a]	65.33±15.30[a]

Different letter in the same column indicate significant difference (P<0.05)

Conclusions

Drying process using sunshine resulted lower water content (23.9%) in sheep skins than in fan drying method (26.6%) and similar to that in AC treatment (25.6%). The decrease of water content in skin under sunshine treatment was quicker (at day 1) than under fan or AC drying methods (at day 2 and 3). The water content is likely affected by relative humidity than by temperature.

Tensile strength and elasticity of finished leather under three drying treatments were similar; however this conclusion must be tempered in caution as high standard errors found in the results.

In general, the technology of drying using fan and AC can be considered to be applied in skin/leather industry especially in wet area such as in Bogor or in a limited drying area, however cost of this technology should be taken into account before further recommendations are made.

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References

Aten, A., .Innes, R.F. and Knew, E. 1955. Flaying and Curing of Hides and Skins as a Rural Industry. Food and Agricultural Organization, Rome.

Balai Besar Penelitian dan Pengembangan Industri barang Kulit, Karet dan Plastik (BBKKP). 1989. Pedoman Pengawetan Kulit Mentah. Penerbit Kanisius. Yogyakarta.

Desrosier, N.W. 1988. Teknologi Pengawetan Pangan. Terjemahan M. Muljohardjo. Universitas Indonesia Press. Jakarta.

Fahidin. 1973. Ilmu Pengetahuan dan Teknologi Kulit. Direktorat Jenderal Peternakan, Departemen Pertanian. Jakarta.

Judoamidjojo, R.M. 1981. Teknik Penyamakan Kulit untuk Pedesaan. Penerbit Angkasa. Bandung.

SNI. 06-0234-1989. Mutu dan Cara Uji Kulit Boks. Departemen Perindustrian dan Perdagangan. Dewan Standarisasi Nasional. Jakarta.

SNI. 06-1795-1990. Cara Uji Kekuatan Tarik dan Kemuluran Kulit. Departemen Perindustrian dan Perdagangan. Dewan Standarisasi Nasional. Jakarta.

SNI. 06-4593-1998. Mutu dan Cara Uji Kulit Jaket dari Kulit Kambing/Domba. Departemen Perindustrian dan Perdagangan. Dewan Standarisasi Nasional. Jakarta.

Steel, R.G.D. dan Torrie, J.H. 1995. Prinsip dan Prosedur Statistik. Terjemahan B. Sumantri. PT. Gramedia Pustaka Utama. Jakarta.