

THE MAIN DIRECTIONS AND WAYS TO IMPROVE THE TECHNOLOGY OF LEATHER AND FUR

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ALTERNATIVE SHORT-TERM PRESERVATION OF GOAT SKIN USING *CALENDULA OFFICINALIS* LEAF PASTE

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Hide/skin, byproduct of slaughterhouse is the basic raw material for the tanning industry. The raw hide/skin contains water 60–70% and protein 25–30% (Balada et al. 2008) which make it vulnerable for bacterial growth. Bacteria degrade the collagen protein that starts immediately after killing the animals (Thorstensen, 1993). Therefore, producing quality leather animal hide/skin has to be preserved just after flaying. Worldwide, in the conventional wet salting preservation method 40–50% (w/w) sodium chloride is broadly used due to its easy availability and cost effective. However, the main disadvantage of wet salting method is that during leather processing it produces a large amount of pollution load in terms of total dissolved solids (TDS) and chloride. The wet salting method pays more than 40% of TDS and 55% chlorides in the tannery effluent (Kanagaraj and Babu, 2002; Covington, 2011). In the past, numerous alternative preservation methods have been developed (Berwick et al. 1990; Cordon et al. 1964; Covington, 2011; Kanagaraj et al. 2005).

In this study, an attempt was made to preserve goat skin with *Calendula officinalis* leaf paste with or without sodium chloride. The preservation process was examined for 28 days and evaluated by monitoring moisture content, hair slip, odor, bacterial count, extractable nitrogen, and shrinkage temperature in comparison to the conventional salt curing method.

Preliminary experiments were conducted to define minimum quantity of salt required for preservation. Four (04) samples of size 30 cm × 30 cm was cut from the freshly flayed goat skin. Different percentages (w/w) of preserving materials were offered with different combinations based on the raw skin weight and assessed periodically (fresh, 1st, 2nd, 5th, 10th, and 15th day of preservation) for physical changes e.g., odor, hair slip, and moisture content. Based on preliminary experimental results, the optimum concentration of salt for preservation was found to be 10% (w/w) with 10% leaf paste.

Based on the preliminary experiment, freshly flayed one (01) goat skin was collected from the local slaughter house; half was taken for the control (50% NaCl) and another half was used as experimental sample (10% NaCl + 10% leaf paste). After applying preserving materials, skins were kept for preservation at surroundings temperature ($28\pm 2^{\circ}\text{C}$) for 28 days.

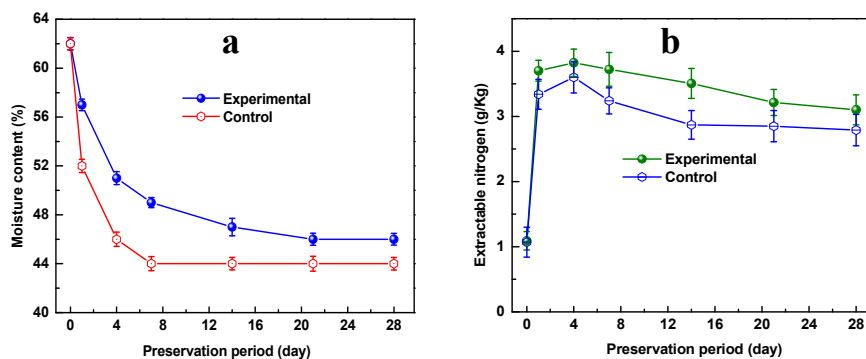


Figure 1. Comparison the moisture content (a), total extractable nitrogen (b)

Moisture and total extractable nitrogen content in experimental (10% leaf paste + 10% NaCl) goat skin in comparison with the conventional method is depicted in Fig. 1 during the period of 28 days. There is no significant variation in moisture content (Fig. 1a) between the experimental and control. In case of total extractable nitrogen, both in experimental and control extractable nitrogen contents (Fig. 1b) were in goat skins different but there were no hair ship or odor of the preserved skins by control and experiment. It is noticeable that combination of 10% NaCl and 10% leaf paste preserves the goat skin for 28 days.

Table 1 shows comparison of physical properties of produced crust leather from the preserved goat skin by the proposed and control methods. The physical properties of the crust leather was fulfilled the requirement of the shoe upper leather.

Table 1. Comparison of physical experimental and control leather

Parameters	Experimental	Control	Requirement
Tensile strength (kg/cm^2)	237.11	228.8	200
Elongation at break (%)	59.01	66.02	40-65
Bursting strength:			
Distension at grain crack (mm)	7.55	8.9	7
Load at grain crack (kg)	31.0	28.0	20

Present preservation method in combination with lower salt formulation could preserve the goat skin for a period of 28 days. This lower salt preservation method reduces TDS, BOD, COD, chloride in soaking operation by 96%, 33%, 68%, and 73% respectively. The method could be a viable option to preserve the goat skin that could reduce the pollution load in leather processing.