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# Home tanning of woolskins with glutaraldehyde

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Sheepskins with the wool trimmed but not removed make cool, comfortable bed pads that prevent bedsores (decubitus ulcers). The wool pile absorbs perspiration and provides good distribution of body heat. The medical and nursing professions have long recognized the value of shearing bedpads but their use has been limited because of the special care previously required in laundering them. The new glutaraldehyde tanning process developed by the U.S. Dept. of Agriculture makes them readily washable. A subsequent chrome tanning makes them still more resistant to hot water shrinkage. Here, Dr. James Deakins, left, of the medical staff of Philadelphia's Chestnut Hill Hospital is discussing the use of shearing bedpads with William F. Happich, who is the inventor of the glutaraldehyde process. The shearing that they are holding has been in continuous use in this hospital for 8 months. . . . A signal contribution to the future of the American sheep industry.

## Home tanning of woolskins with Glutaraldehyde

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### Introduction

There are many purposes for which launderable, home-tanned woolskins can be used, for example, as pads for tractor, truck and chair seats, and as throw rugs. The wool can be sheared evenly and hand-sewn articles can be made. The optimum wool length depends upon the use of the woolskin. For example, bedpads may have a sheared-wool length of one inch, rugs 2 to 3 inches. When the wool length is 4 inches or more and is felted and matted or starting to shed, the skin is not suitable for tanning as a woolskin. However, since the finishing operations to process the woolskins for use as bedpads or paint rollers require special machinery and skilled operators, the home-tanned-and-finished product may not be suitable for these uses.

Numerous requests have been received from sheep breeders associations, sheep ranch owners, farmers, and others for information concerning the home tanning of woolskins with glutaraldehyde. Accordingly, a simplified procedure was developed

that could be used by the individual sheep raiser and requires only a minimum of equipment and chemicals.

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**A commercial process for the tanning of woolled sheep and lamb skins was developed earlier by the Eastern Regional Research Laboratory. For the benefit of sheep raisers having only limited numbers of pelts to process at one time, the editors of *The Shepherd* asked if this method might be adapted to small-scale operations.**

**This contribution with its excellent sequence photos is in answer to this request. We are indebted to Agricultural Research Service for their splendid cooperation.**

—The Editors

### Preparation for Tanning

Skin the sheep immediately after a slaughter. Be careful to avoid cutting or scoring the skin, as this will damage the usefulness. Remove the head and ears (Fig. 1). Cut off the excess flesh and fat.

Scour by stirring the skin for about 5 minutes with a wooden paddle in a solution containing 1 to 2 cups of a mild soap or detergent dissolved in approximately 11 gallons of water at a temperature not over 90°F. (Fig. 2). Drain over a board

or sawhorse, then rinse in several changes of water at the same temperature. The scouring and rinsing should be repeated until the skin and wool are clean.

Place the skin, wool side down, over a wooden "beam." Trim the ends of the legs and scrape or cut off any remaining flesh (Fig. 3). Then scrape the entire flesh side with a tanner's fleshing knife or with a butcher knife (end inserted into a block of wood) held firmly against the skin, pushing away from the body (Fig. 4). Use only moderate pressure to avoid cutting holes in the skin and remove the layer of fat, elastic and muscle tissue. Rinse the flesh side with water. Drain, flesh side up, over a wooden sawhorse or board until the water has drained off, 20 to 30 minutes. Then squeeze the excess water out of the wool and skin by hand and weigh. Record the weight in pounds and ounces. Refrigerate or cool the skin overnight if possible but do not allow it to freeze. If tanning cannot be started the next day or if there are more skins than can be handled at one time, the flesh side of the skins should be rubbed with a substantial amount of fine grained salt, then covered with additional salt. Fold in the flesh side from each end and store in a cool location. Before tanning, soak the skin in cool water overnight.

### Glutaraldehyde Tannage

For each pound of the drained, wet weight of the scoured woolskin, place 5 quarts of water (approximately 85°F.) in a clean, water-tight wooden barrel. Stainless-steel kettles may be used but iron or galvanized tubs should never be used for tanning. Add ½ pound of technical grade salt for each gallon of water and dissolve by stirring

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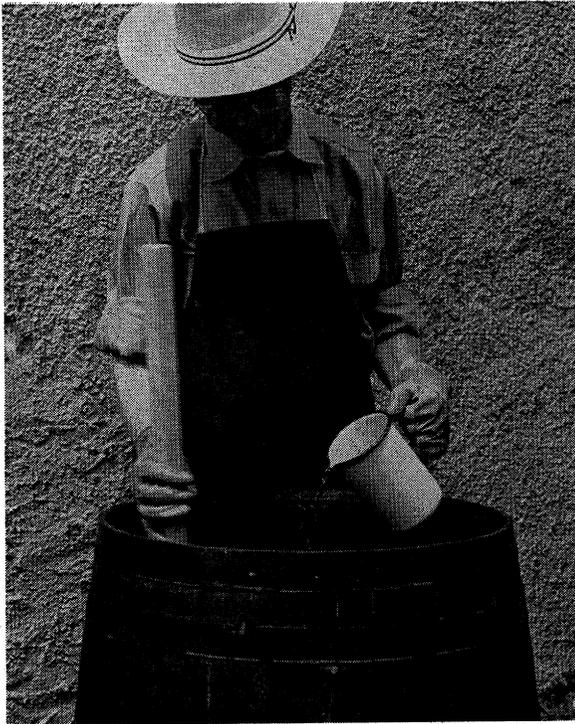


FIG. 5—Preparing the glutaraldehyde tanning solution.

Immerse the woolskin carefully in the glutaraldehyde solution to avoid splashing. Stir for about 5 minutes with a wooden paddle, then for one minute at hourly intervals during the day. Cover the barrel with a wooden cover between stirrings and overnight. After several hours the color of the wool and skin becomes pale yellow as tanning proceeds. Allow to stand overnight with the woolskin completely immersed. Stir one minute per hour the second day. Continue the tanning for at least 48 hours. Progress of the tannage may be followed by determining the shrinkage temperature of the skin as follows: Cut a  $\frac{1}{4}$ " x  $2\frac{1}{2}$ " piece, preferably from the neck area (Fig. 6). Trim off the wool. Attach one



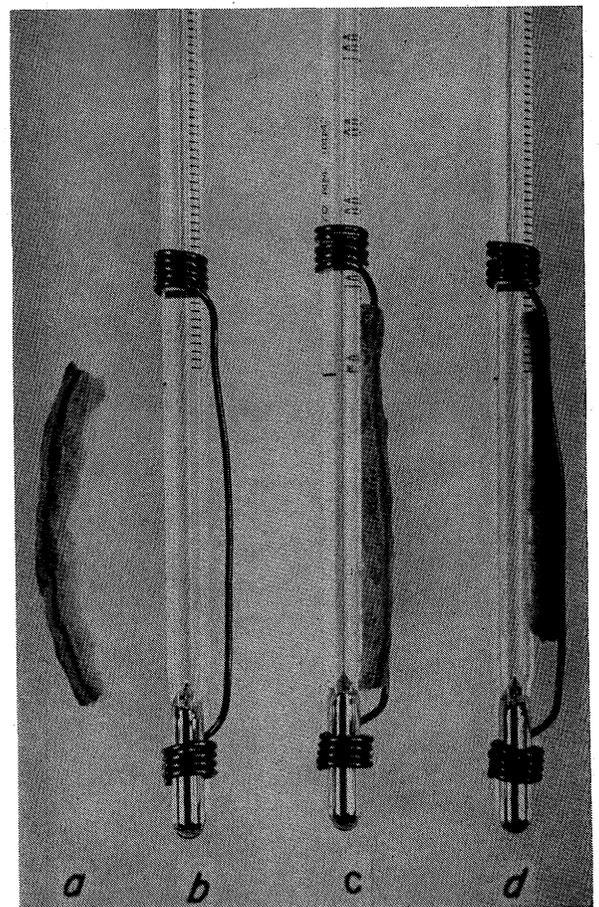
FIG. 6—Cutting a sample of woolskin for the shrinkage temperature test.

end of the skin with a copper wire guide to the bulb end of a thermometer, allowing the lower end of the skin to hang free (Fig. 7). The guide can be made easily from #16 or #18 soft copper wire. The skin should be held with sufficient pressure so that the free end does not float out into the water, but not so tightly that it cannot shrink. Hold the sample of skin in a pan of water at room temperature, then heat slowly. Note the temperature at which the skin starts to shrink. This is known as the shrinkage temperature or  $T_s$ . When the skin has a  $T_s$  of at least 176-185°F. (80-85°C), the glutaraldehyde tannage has been completed. Even though the maximum  $T_s$  can be obtained in about 48 hours when the tanning solution is about 70°F., the glutaraldehyde continues to combine with the skin and a fuller, softer leather can be obtained by continuing the tanning for another 6 or 8 hours. Drain, then wash in several changes of water. Hang the skin, wool side up, over a wooden sawhorse or board overnight.

#### Fat-liquoring, Drying and Staking

Weigh accurately an amount of a suitable fat liquor oil (for example: a highly sulfated neatsfoot oil or a

FIG. 7—  
Shrinkage temperature apparatus (b) with sample of skin before (a,c) and after (d) shrinkage.



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FIG. 10—  
Staking the leather on a  
"staking board."



FIG. 8—Fat-liquoring by rubbing in the oil emulsion on the flesh side of the woolskin.



sulfited sperm oil) equal to 2 to 3 per cent of the original drained weight of the scoured woolskin. If the skin is very greasy, reduce the amount of fat liquor. Add an approximately equal volume of warm water while stirring, to form an emulsion. Add a volume of clear, household ammonia equal to  $\frac{1}{2}$  per cent of the drained weight of the scoured woolskin and stir. Divide the fat liquor into two equal volumes. Place the woolskin on a flat surface. Apply a small amount of the fat liquor emulsion by hand or bristle brush to an approximately 10-inch square area of the flesh surface and spread evenly and quickly with a back-and-forth motion (Fig. 8). Repeat until the entire flesh side has been covered. After 30 min. apply the second portion of the fat liquor as above. With practice the fat liquor can be applied uniformly. Place the skin, flesh side up, on a flat surface and cover with an impervious sheet of plastic such as polyethylene overnight. If several skins are fat-liquored at one time, they may be piled, flesh side to flesh side, overnight.

The next day place the skin, wool side up, over a wooden sawhorse and dry the wool at room tempera-



← FIG. 9  
Drying the woolskin on a  
plywood board.



FIG. 11—Sanding the flesh side of the woolskin.

ture. An electric fan may be used to speed the drying. Then nail the skin, wool side down, to a plywood board, stretching it slightly. Space the nails (#6 finish) every 5 or 6 inches around the circumference and about  $\frac{1}{2}$  inch in from the edge (Fig. 9). Dry the flesh side at room temperature. When nearly dry, test the edge of the leather by stretching a small area with the fingers. When the color lightens considerably, pull the nails and stake the leather by pulling the flesh side repeatedly back and forth in all directions over the edge of a "staking board" (Fig. 10). The top of the board is rounded and beveled to a  $\frac{1}{16}$  inch edge. Staking must be started at the proper moisture content. Continue staking at intervals until the leather is dry. If the dry leather is not soft and pliable, dampen the flesh side lightly with water and cover with plastic for at least several hours, or preferably overnight. Dry and stake as above. If necessary repeat the dampening and staking until the leather remains soft and flexible.

Grease spots on the dry leather can be removed by sponging with a dry-cleaning solvent or by dipping in white gas. Solvents should be used in a well ventilated area.

#### Finishing

The flesh side of the leather may be cleaned and made smooth by rubbing lightly with medium-grade sandpaper fastened to a block of wood (Fig. 11), or by use of a sand-

ing machine. The thicker areas such as the neck may be sanded to make the leather thinner and more flexible.

The wool should be combed out carefully, using a widely-spaced, metal-tooth dog comb (Fig. 12). The narrow-spaced side of the comb may be used for the second combing. If desired, the wool may then be combed to a vertical position and sheared evenly.



FIG. 12—Combing the wool — final stage of the process.

#### Laundering

Woolskins or shearlings tanned with glutaraldehyde can be successfully laundered many times by hand or in an automatic washing machine. Use moderately warm water at not over 120°F. (fine fabric setting) and a mild soap or detergent. Wash for 5 min. Longer washing periods may mat or felt the wool. Rinse with clear, cool water several times. If necessary, repeat the washing and rinsing. Spin to extract the water. If hand laundered, shake out the excess water by hand. Hang at room temperature to dry, which will require about 48 hours. If desired, the wool may be combed with a metal-tooth dog comb.

#### Material Suppliers

Fat liquor oils may be obtained from the Salem Oil and Grease Co., 60 Grove Street, Salem, Mass. 01970; Nopco Chemical Co., 60 Park Place, Newark, N.J. 07102; Reilly, Whiteman, Walton Co., Conshohocken, Pa. 19428, or other specialists in tannery oils.

Glutaraldehyde (25 per cent commercial solution) may be obtained from the Union Carbide Chemical Co., 270 Park Ave., New York, N.Y. 11205.

Mention of brand or firm names does not constitute an endorsement by the Department of Agriculture over others of a similar nature not mentioned.

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*The author wishes to thank Mr. Clifton Audsley for taking the series of photos.*

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with a wooden paddle. Measure  $2\frac{1}{4}$  fluid ounces of glutaraldehyde (25 per cent commercial solution) for each pound of the drained, wet weight of the scoured woolskin, pour it carefully into the salt solution and stir well (Fig. 5). Glutaraldehyde is irritating and contact

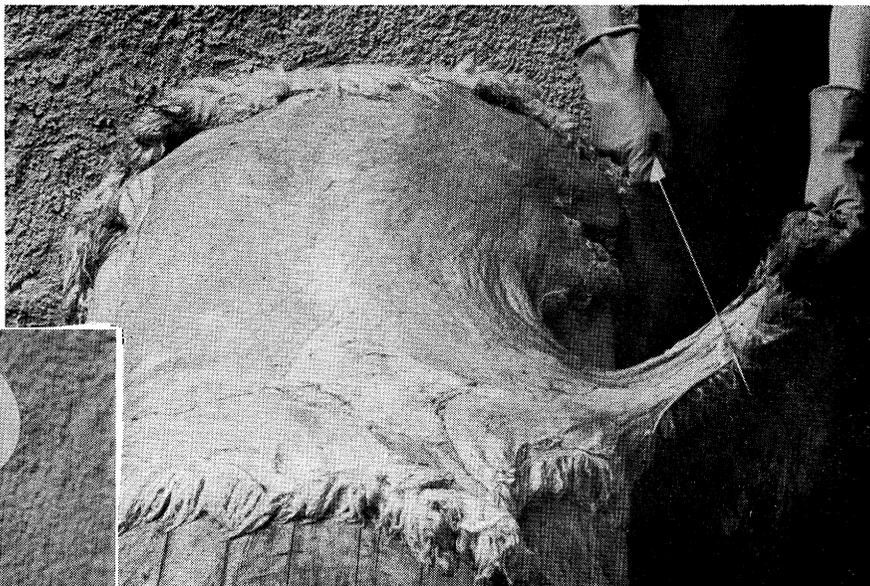


FIG. 3—Trimming the woolskin.



FIG. 1—Removing the head and ears from the woolskin.

with the skin and eyes or inhalation of vapors should be avoided. The use of rubber gloves, a rubber apron, a safety-visor or safety glasses, and adequate ventilation is recommended. The following is an example of the chemicals that were used to tan a woolskin in the laboratory.

### SAMPLE RECIPE



	%	Weight	Volume
Woolskin, scoured, wool length 2.5 in.	100	13-lb. 15-oz.	
Water, approx. 85°F	1045	145-lb. 11-oz.	17½ gal.
Salt, technical grade, percent on solution basis	6	8-lb. 12-oz.	
Glutaraldehyde (25% commercial solution)	15	2-lb. 2-oz.	1 quart



FIG. 2—Scouring the woolskin with soap or detergent.

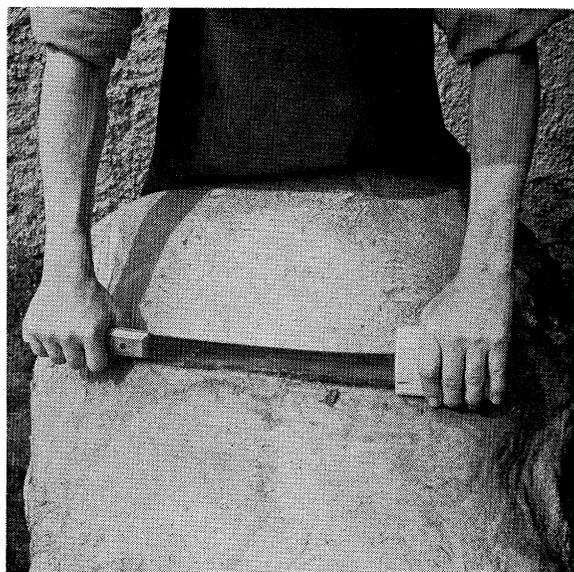


FIG. 4—Scraping the flesh side of the woolskin with a butcher knife inserted into a block of wood.