THE BASICS OF TANNING GOAT HIDES

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Why Tan Skins?

We have all seen rugs and furs made from animals, trophy bucks mounted by a taxidermist, and maybe even own a sheepskin. We may have goats with hides that would make an attractive rug or cover. Possibly, there is even a market for colorful goat hides or crafts made from them. To produce a goat rug requires knowledge of the art of tanning. When speaking of tanning hides one naturally thinks of large tanneries producing leather and furs; however, it is possible to tan hides at home. In the distant past tanning meant taking the bark of certain trees, oak for example, and pounding the bark into a mush, mixing it with water, and soaking the dehaired hide of an animal in the mixture for several weeks or even months. Deer buckskin was made by native Americans using animal brains as a source of preserving agent. Later, chemical methods of chrome tanning were developed, which are still in use. Today, in addition to the above methods, there are synthetic tanning agents that are easy to use and fairly inexpensive. One advantage of tanning at home is cost. For example, professionally tanned sheep or calf skins can cost $70 to $100. Tanneries can be found where you can send preserved hides to be professionally tanned. Costs for such services may be on a per hide or per square foot of hide basis. Alternatively, one can purchase tanning kits, one of which will tan up to 20 pounds of hide (the equivalent of two deer skins) for between $25 and $35, and finish the job in two to six weeks. The equipment needed to tan hides can be purchased or much of it can be fashioned from items found around most households or farms. Although home tanning may not match the quality of a professional tannery, good quality, long-lasting products can be made. In addition to home use, some of these products could be sold, or someone who earns a good reputation as a home tanner could receive hides to tan.

Where Can One Find Information?

Books on tanning or taxidermy or speaking with a taxidermist are good places to start learning about tanning. At the end of this article is a list of some of the texts that may be available at your local library. These texts outline the steps required, equipment needed and provide many tanning recipes and tips on how to successfully tan hides. Additionally, they list the chemicals you will need to purchase to finish your project. Often, these texts recommend that a beginner purchase a tanning kit designed to tan a small amount of hides. These kits come complete with tanning chemicals, instructions, and a list of the needed equipment. Two examples of such kits are:

1 Mention of trade names, proprietary products or vendors does not imply endorsement by Langston University or the E (Kika) de la Garza Institute for Goat Research of the products or vendors named or criticism of similar products or vendors not mentioned.
Tannery in a Box - a chrome sulfate based tan which includes chemicals for hair-on or hair-off tanning offered by Tandy Leather Co.; and EZ-100 Kit - a synthetic tanning agent touted as environmentally safe manufactured by Rittel and offered through taxidermy supply companies. Some tanning agents come in a paint-on form in which the tan is applied directly to the prepared hide with no other chemicals needed. Two examples of these are: Tannit Solution - offered by Tandy Leather Co.; and Liqua-Tan - a liquid tanning agent manufactured by Knobloch, Lafayette, CO. Taxidermy supply companies and sources for tanning chemicals can be found through speaking with a taxidermist, the phone book or on the Internet at www.taxidermyonline.com or www.taxidermy.net under taxidermy supplies.

**Basic Tanning Steps**

Whatever method is chosen to use in tanning a hide - chemical or paint-on, kit or purchase of separate chemicals - the basic steps are the same: skinning the animal; preserving the hide either through salting, drying or freezing; fleshing the hide; pickling and neutralizing; the actual tanning process; and drying, softening, and finishing. As with any craft there are many variations on the main themes and different texts will provide different tanning recipes, order of steps, chemicals to use, and tips on how to successfully follow their method. It is a good idea to read through several methods and speak with someone knowledgeable on tanning hides before selecting a particular one. As each method or tanning recipe is slightly different, it is best to follow the instructions and learn the basics. One can then experiment in the future.

It is not the goal of this paper to present all of the variations of the steps needed in tanning hides. Rather, some pertinent information on each of the basic steps will be given. More detailed information can be found in the texts listed at the end of this paper or one of the other information sources previously mentioned.

**Skinning**

Most people who want to tan a hide will also likely use the carcass for meat and will take the animal to a meat locker or abattoir where it will be expertly skinned. If you wish to skin an animal for its hide, be sure the carcass is fresh as putrefication and decay begin immediately upon death. Bacteria become active breaking down tissue, damaging the hide, and causing hair slippage. Also, ligaments under the skin can shrink as the carcass cools making skinning more difficult. If you do your own butchering this is no problem; however, if an animal is found dead on pasture caution is warranted. Some animal diseases, such as rabies, tetanus and anthrax, can be transmitted to humans through contact with infected animals. If an animal is seen to be ill, acting strangely or found dead for an unknown cause it should be buried or disposed of and not skinned, even with gloves on (Hobson, 1977).

Many people who hunt or butcher at home have experience skinning and have their own favorite tools and methods. Skinning can be done with the carcass hanging or lying. Generally, hanging is easier as after the initial cuts are made the skin can be pulled downwards or away from the body, thereby lessening the need to use a skinning knife. A skinning knife should be very sharp and used sparingly to decrease the chance of cutting the skin which can mar the hide. Care
should also be taken to not take large amounts of fat or meat with the skin as this material will have to be removed later and can impede salt penetration when preserving (see following section). A good job in skinning will make some of the tanning steps easier.

**Preserving**

If the hide is not to be tanned immediately it must be preserved. The goal of preservation is to stop the putrefaction and decay begun by bacteria immediately upon death. The main methods of preservation are salting, freezing and drying. Salting the hide to remove moisture is the most common method. In salting a hide use only non-iodized salt such as non-iodized table salt or pickling and curing salt. Rock salt should never be used as it has impurities. A fine grain salt is preferred as large grain salt will not penetrate the hide well. To salt a skin, lay it flat and pour a generous amount of salt down the middle of the hide. Use approximately one pound salt for each pound hide and rub it in thoroughly, covering every portion. Fold the hide flesh to flesh, roll it up and place it on a slanting board allowing it to drain. The following day shake off the wet salt and resalt with new salt. If the skin has finished draining it can be laid out flat to dry, which may take several days, or longer, depending upon the weather. Hides should not be dried in direct sunlight or where temperatures are very high. Once dry, the skin can be stored in a dry place until tanning.

To freeze a hide, fold the hide flesh to flesh, roll, and place inside a plastic bag. A frozen hide will last for months or even years with no damage to the hide (G. Dimaio, Industrial Specialist, USDA-ARS Hides, Lipids, and Wool Research Unit, Eastern Regional Research Center, Wyndmoor, PA, personal communication). However, it has also been written that hides to be tanned with the hair on should not be frozen as this can cause hair to fall out (Tannery in a Box Instruction Sheet). As few people own a freezer in which they wish to freeze goat hides, salting will likely remain the preferred method of preservation. Air drying, also called flint drying, is a less effective preservation method than salting. It is extensively used in developing countries where hides are stretched and tied in frames to air dry (Kniefel, 1991).

**Fleshing**

To flesh a hide means to scrape all fat, meat, and membranes off the skin in preparation for the actual tanning process. Fleshing can be done before the hide is salted and some authors recommend this as the salt then penetrates the skin more easily. Conversely, other sources state that salting, in addition to preserving the hide, makes fleshing easier. If a fresh hide is to be tanned immediately after fleshing, it does not need to be salted. Fleshing is accomplished through the use of a fleshing beam and a fleshing knife. A fleshing beam is a piece of wood over which the hide is draped and can be fashioned out of a 2" × 6" or 2" × 8" board five or six feet long. One end should be cut to a blunt point and all edges rounded and smoothed. The board is then mounted on legs so that the pointed end comes around waist high. A fleshing knife is a blade with a handle on both ends so that even pressure can be exerted as the blade is pushed down the hide. These can be purchased through a taxidermy supply company or a long-bladed butcher knife can be used with the pointed end driven into a block of wood providing a handle. Alternatively, a draw knife could also be used. Churchill (1983) describes methods to make fleshing knives and other knives from used industrial
To flesh a hide drape it over the pointed end of the fleshing beam. Using the fleshing knife, push down the hide scraping off unwanted material. Either the blunt or sharp edge of the knife can be used, depending upon one's preference and experience. To make fleshing easier and lessen the chance of cutting the hide, it is important to flesh with the lay of the hair. The legs should be fleshed towards the belly and the hide from the tail pushing towards the neck (Rittel, 1994b). It is also important to not cut too deeply into the hide as this will expose hair roots and cause subsequent hair loss. Fleshing is time consuming but must be done properly, removing even the thin membrane tightly held onto the skin. Fleshing machines, found in taxidermy supply catalogs, are available that can speed up the process, although the least expensive models cost well over $100. An alternative to purchasing a fleshing machine is to use a wire wheel mounted on an electric grinder (Knobloch, Lafayette, CO, personal communication). However, great care must be taken to not damage the hide or expose hair roots while using mechanical fleshing machines.

Pickling and Neutralizing

Pickling, as described by Rittel (1993), is the use of an acid solution to acidify and temporarily preserve a skin while physically and chemically preparing it for tanning. Most tanning recipes will call for an acid pickle, though it may be included in the tanning process itself and not a separate step. Some paint-on tans, such as Tannit solution and Liqua-Tan, are applied directly to the fleshed hide without the skin undergoing a pickle. Pickling solutions are mixtures of water, salt, and acid. The pH must be carefully checked and proper precautions, i.e., use of rubber gloves, eyewear, etc., should be followed when using acids. Any powders should be mixed with a small amount of water before mixing in the larger solution. Acids should be added slowly to the pickle, pouring them along the side of the container so as to run gently into the solution. Mix slowly, but well. There are a number of acids and formulas that are used in pickling and the tanning recipe one follows, or kit that is used, will have specific instructions.

Skins are usually left in the pickling solution for three days after which time they must be neutralized. Neutralizing raises the pH of the skin through the use of an alkaline substance such as sodium acetate, sodium formate, sodium bicarbonate or others. Neutralization is generally brief, 15 to 20 minutes, after which the skins should be rinsed with clean water and put into the tanning solution (Rittel, 1993). Again, the tanning recipe or kit should have complete instructions on the neutralization method.

Care should be taken in disposing of the pickling and neutralizing solutions. Acid pickles should be raised to a pH of 6.5 to 7.0 before dumping. Rittel (1993) states that sulfates can be considered as hazardous solutions and if an acid is used in which sulfates are formed local health authorities should be contacted concerning proper disposal. Rittel (1993) continues that as solutions contain salt they should never be put into septic systems and should be dumped in a driveway or other area where vegetation does not grow.
Tanning

To describe the varying tanning recipes and methods is beyond the scope of this paper and those can be found in various texts, taxidermy supply, or tanning chemical dealer catalogs and in the instructions included with tanning kits or chemicals. The main tanning process may be as simple as one of the paint-on tans mentioned earlier or more complex entailing the application of tanning chemicals in a tanning soak or bath. Each individual method will have its advantages and disadvantages and the reader is urged to gather information on different methods through reading, obtaining catalogs, and speaking with experienced tanners.

The main categories of tanning as described by Hobson (1977) are: vegetable; mineral; oil tanning; and combination tanning. The vegetable methods, using tree bark or other plant parts, were those first used and are still in use for some leathers, albeit that plant extracts are used rather than tree bark. Vegetable tanning can even be tried at home by grinding bark, leaves, twigs, seeds, and other parts of tanning-containing plants into a solution in which small hides could be soaked. Vegetable tans, however, stain the hair or fur and can take up to six months or more to finish. To test if the tanning process is complete, cut a thin strip of the hide and see if the color is the same throughout without a lighter layer in the middle that indicates the tanning process is not complete. The ultimate test of a properly tanned hide is to put a small piece of the tanned hide into boiling water. If incompletely tanned, the piece will curl up; a properly tanned hide should be unaffected by boiling water (Hobson, 1977). Others state that a piece of well-tanned hide should withstand at least two minutes of boiling before it begins to curl (G. Dimaio, Industrial Specialist, USDA-ARS Hides, Lipids, and Wool Research Unit, Eastern Regional Research Center, Wyndmoor, PA, personal communication).

Mineral tanning and vegetable tanning are the main methods used by commercial tanneries. Mineral tanning can be done at home and two popular recipes are alum tanning and chrome tanning. While both recipes result in a well-tanned hide, alum tanned hides tend to sweat if atmospheric humidity becomes too high. Tanning using mineral methods also requires closer attention to the tanning process than the use of vegetable tanning solutions. The addition of chemicals, such as sulfuric or other types of acids, and solution pH levels must be carefully monitored. Rubber gloves and eye protection should be worn and care taken when mixing solutions. Tanning should be done in a plastic barrel, never in metal. Leaving a hide to soak in a mineral tanning solution too long can damage the hide. Additionally, inadequate washing of the hide after tanning to remove all chemicals may result in acid residues left in the skin, which could react with moisture and damage the hide. Leftover tanning solutions may also pose a disposal problem. Whatever tanning method is used, local laws concerning waste water disposal must be followed. In rural areas care must be used in disposing of solutions and they should never be dumped where they can contaminate streams or ground water. Chemical solutions, and salt water solutions, should never be put into septic systems as these can kill the microflora upon which such systems depend to break down waste. Consult your local municipality for proper disposal methods.

Oil tanning is a means of preservation and not a true tanning method. A warm oil is brushed into the hide and the hide is left in a warm place for the oil to soak in. Several applications are needed and this method is not suitable for hair-on tanning. Combination tans are those that use one
or more methods.

A tanning method gaining popularity is the use of a synthetic tanning agent or syntan. Syntans are described by Rittel (1994a) as man-made tanning agents which are highly reactive, form strong bonds and, when properly used, result in well-tanned, long-lasting hides. Syntans are used by commercial tanneries in conjunction with mineral tans as they improve the dyeing ability of leathers (Rittel, 1994a). At home, syntans can be used alone or in combination with mineral tanning agents. One example of a syntan is EZ-100 by Rittel. EZ-100 is administered as a soak or bath in which the hides are placed after pickling and neutralizing. EZ-100 also touts itself as environmentally safe by using acids and tanning agents that degrade to fertilizer. Hides tanned with EZ-100 can be washed in lukewarm water.

Drying, Softening, and Finishing

After the tanning process is over the hide must be dried. Again, follow the drying instructions for tanning method you are using. Drying methods can range from simple hanging or laying flat to tacking on wood or tying in a frame. Usually, an oil will also be applied in this process to help soften the skin. While the hide is slightly damp is the time to begin softening the hide. To do this, make a staking beam out of a 2" × 6" board cut and fashioned in the shape of a braced, inverted T with the upright end rounded to a blunt point. The damp hide is taken and the flesh side is rubbed across the point in much the same way as one shines shoes. This movement stretches and breaks the skin fibers leaving a soft hide. Staking takes time and effort and the time spent in this activity will determine how soft the finished product will be. It is important to do this while the hide is still damp. If the hide becomes too dry, rewet it and begin again.

Commercial tanneries use equipment for softening such as large, rotating drums that tumble the hide, generally with sawdust, as it dries. In addition to softening the hide, a solvent may be added to the sawdust to help clean hair or fur. Some texts recommend using an old laundry dryer with the holes plugged for tumbling hides. While this will help clean the hair it will not help significantly in softening the hide. To do this requires a tumbler with at least a six foot drop along with 100 pounds of hardwood sawdust (P. Helms, McKenzie Taxidermy Supply, personal communication). Finishing the softened hide entails cleaning the hair and removing excess oil. This can be done with a tumbler or by simply rubbing sawdust into the hair. Rittel (1994a) recommends that local sawdust not be used as it may contain pitch and be unevenly grained. Taxidermy or tanning chemical supply houses sell sawdust and solvents to be used in cleaning. Alternatively, Hobson (1977) explains how to use cleaning substances such as cornmeal, oatmeal, bran, chalk, and plaster of Paris. Finally, the skin side of the hide can be sanded or rasped to remove rough spots or a buffing machine could even be used.

Optional Steps

The above steps and tips are meant only as a guideline for someone to begin tanning. When reading about tanning, additional steps such as dehairing and degreasing will be found. Dehairing is usually done by soaking the hide in a lime or caustic lye solution after which the hair is scraped off and the hide tanned for leather using the same or similar methods as those described. Degreasing is done on hides with large amounts of oil, such as raccoon, bear, and the like. It is unlikely that goat
hides would need degreasing.

Use of Tanned Hides

Tanning is not easy and failures should be expected. But, through practice and experimentation the techniques can be learned and good quality hides can be produced. The uses for tanned goat hides are limited only by quality of the finished product and the imagination of the tanner, or purchaser. Rugs, seat covers, decorative wall hangings with a pattern shaved in the hair or a square shaved in which a picture is painted, goat leather picture or mirror frames, key chains, place mats, etc., all of these ideas and many others are possible.

Partial List of Supplies Needed to Tan Hides

$ skinning knife if skinning will be done
$ sharpening stone
$ non-iodized salt, not rock salt
$ fleshing knife or butcher knife with pointed end driven into a small block of wood
$ fleshing beam
$ plastic garbage can or other plastic tub (tanning should never be done in metal containers)
$ wooden pole or paddle to stir tanning solutions
$ tanning kit or chemicals
$ rubber gloves and eye protection for handling chemicals and solutions
$ pH paper if pH of solutions must be checked
$ staking beam (fleshing beam could also be used for this)
$ comb or brush for hair
$ suitable place for tanning, not too hot or cold
$ area where hides can be laid upon wood or a bench, not concrete floors
$ scale to weigh hides and chemicals
$ source of hot water to mix solutions

List of Some Available Books on Tanning and Taxidermy


Addresses of Some Taxidermy and Tanning Chemical Supply Companies

Jonas Supply Company
2260 Industrial Lane
Broomfield, CO 80020
Phone: 800-525-6397
www.jonastaxidermy.com

Knobloch
10675 Empire Road
Lafayette, CO 80026
Phone: 303-666-9045

McKenzie Taxidermy Supply
P.O. Box 480
Granite Quarry, NC 28072
Phone: 800-279-7985
www.mckenziesp.com/mcktaxid

Rittel Tanning Supplies
51 Summer Street
Taunton, MA 02780
Phone: 508-822-3821
Fax: 508-828-3921

Tandy Leather Co. (Has locations throughout the U.S.)
4910 N. May Ave.
Mayfair Village
Oklahoma City, OK 73112
Phone: 800-647-9347

Other companies can be found in the Yellow Pages or on the Internet at www.taxidermyonline.com or www.taxidermy.net
References


Rittel, B. 1994b. When fleshing or shaving- the only way is the right way. Breakthrough. 36:22-24.