



Washing Fibers 101

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No matter what you have heard- it really isn't a scary venture! We have heard so many people afraid to wash their fibers for fear of creating a felted monster. Anyone who has tried felting knows that it takes hot water and soap- yes that is true- but one element that many forget..... LOTS of agitation! The 1st 2 things mentioned will not , not matter how hard you try, felt your fibers.

Now let's get a few things together and well, go wash some fiber!

Whether you have a sheep's fleece, a goat, some alpaca, or maybe even dog or cat, you need to follow these instructions. While sheep and goats have a substance called lanolin, which we will discuss later, never underestimate the value of cleaning alpaca, llama or similar fibers. And no, you will not felt alpaca or the like in hot water. I was told years ago to use tepid water for these fibers. Well truth be known, the fibers never got really clean. We use very hot water all the way through the process for ALL fibers!!!!

Things you will need

- Decide where you will wash your fibers - in a large tub or the washing machine.
- Determine the temperature of your water by using a thermometer. You must have at **least** 150°F water from the tap, or you will need to boil some water on the stove to add to the wash basin.
- Weigh the fleece and measure no more than 5 pounds of fiber. This is a good amount in a washer or laundry tub. It means about 15 gallons of water to 5 pounds of fiber.
- Make sure you have lots of detergent – we use Dawn and have since pre 1995.
- Baking Soda (optional)
- Citric Acid or white vinegar (optional)
- Have gloves on hand
- A good drying rack or an old screen

OK now- do you have everything ready?

Because so many of you ask.....

We use Dawn for washing all wool , Alpaca, Llama and other none lanolin fibers. We also use HOT water to wash and rinse them as well. Our water is set at 180 degrees. This temperature is the same all the way through the process, which is 3 cycles – each one is 1 wash and 2 rinses.

Ready..... Set.... let's go!

1. Fill your tub or washing machine with at least 150°F water
the best way to get the hottest water in your washing machine is to shut off the cold spigot to the washer.
2. Add your detergent at a little less than 1/3 cup to 1 pound of fleece. Also add 1 cup of regular table salt is you have hard water. We have found this softens the water and also helps with the cleaning. We buy it in bulk at Costco.
I add 1.5 - 2 cups of Dawn per 5 pounds of wool, 1 cup per 5 pounds of alpaca.
3. Gently mix the water and detergent making sure to make as few suds as possible.
4. Add your fibers, about one handful at a time, opening up, or fluffing the locks up as you go; pressing down, but NOT AGITATING them.
5. Close the lid on the washer or place a black plastic bag over the fibers to retain the heat.
6. Leave in the water 20 minutes- no longer than 1/2 an hour. You DO NOT want to let the water cool especially for wool or mohair. Lanolin re congeals at 110°F , which is still very hot for our hands. Cooling the water will make it more difficult to strip the lanolin and dirt.
7. Using the washer- remove fleece from tub and place in washing machine- or start the rinsing process with your fleece in the washer. Turn the knob to the LAST rinse cycle. You want drain and spin only! Repeat the rinse again, removing the fleece and adding to the water as you open the locks as you go.
8. Remove the fiber and wipe out the bottom of the washer.
9. Repeat Steps 1 through 8, but cut the soap in half.
10. Final wash and rinse - Add a small amount of soap and again add your fibers, opening the clumped locks up as you go; pressing down, but NOT AGITATING them. To this last wash water , drizzle a bit of Dawn, 1 cup of vinegar or ¼ c citric acid and 1/2 cup of baking soda. Let sit about 5 minutes and spin out. This has helped us with left over residue from soap and dirt.
11. Give your fibers a final clear water rinse buy just covering the fibers and spinning them out.
12. Take your fibers to your drying rack- as the fiber is drying we fluff the fibers up. This helps remove tinier VM, and helps the fibers dry quickly. * If you do not have a fan on the fibers, it may take up to a day and 1/2 to dry them. In the summer months you can place your racks outside, avoiding direct sunlight.
13. Your fibers are now ready for processing, by you or your favorite processor-
*we would like to think it is Spinderella! :-) But note- we are very picky about cleanness and may have to wash your fleeces again.

We suggest before adding your fleece to a drying rack, pay attention to several things- How does the fleece feel in your hand ? Sticky, soft, dirty . Washing is a tactile skill

- Do a cup test to make sure you have washed your fibers well
 - Get a clear glass
 - Fill it with 150 degree water
 - Add a few drops of Dawn to make it pale blue
 - Add a lock of your fiber – opened up a bit
 - What do you see?
 - Pale Blue water?
 - Milky white – means there is lanolin left
 - Brown/Black - you have lots of dirt left in the fiber – time to wash again

FOR MOHAIR or SURI ALPACA:

We have found that by adding 1 cup of Isopropyl Alcohol removes the wax on the fiber. This also helps with waxy suri alpaca fiber as well.

Why Vinegar and Baking Soda?

Why does adding Vinegar and Baking soda to the next to the last rinse work? Wouldn't the vinegar and soda neutralize each other, since one is an acid and the other a base???

Vinegar is acidic in nature which helps in stain removal, cleaning up dirt and grime and killing germs and bacteria. Baking soda is a salt with alkaline properties that neutralizes acid.

Answer: When you neutralize an acid with a base, you do not only end up with water. In the vinegar/baking soda solution, there's other stuff floating around other than protons (H⁺) or hydroxide (OH⁻). In the vinegar there's going to be a mixture of acetic acid and acetate (both from the vinegar) as well as other things. What you basically have is a buffer solution. A buffer solution is a solution that is only SLIGHTLY basic or acidic and it tends to bring highly acidic stains/odors back towards a more basic state and highly basic stains/odors towards a more acidic state. In this way a buffer solution helps to neutralize both acidic and basic stains. In our vinegar/baking soda rinse, the solution will also have lots of ions (charged particles) floating around which will help dissolve charged dust particles and other compounds which will help dissolve organic muck.

The main value of this is the immediate reaction. It lifts and breaks up dirt, but after that, what you have leftover is just salt water. That salt has no cleaning ability beyond the mild ability to suspend hard water deposits, which is only useful if you have hard water and then, only if you have another CLEANING agent in the mix- i.e. Dawn.

In testing the Ph. of the final rinse it is a 6.5- 7. Pretty neutral. Even the vinegar/baking soda water was neutral. The volcano is so small - last seconds - the 1/2 - full washing machine. The final rinse is to cover the fiber and spin. We plan to have the fibers tested since so many people have had concerns or questions. We simply have seen nothing weaken, but we do not have the instrumentation to do so. Off to get some samples made and in the mail to our fleece tester. :-)

Why HOT water?

There are two principals at work - **thermodynamics**, and **kinetics**.

In plain terms, you could think of thermodynamics as an answer to the question "how much will dissolve if I wait for an infinite amount of time," whereas kinetics answers the question, "how long do I have to wait before X amount dissolves." Both questions are not usually easy to answer on the macroscopic scale (our world), but they are both governed by two very easy to understand principles on the microscopic scale (the world of molecules): **potential** and **kinetic energy**.

The molecules of hot water have high kinetic energy than the cold water. So they diffuse with dust particles easily. Thus carrying away impurities with it, hot water is better than cleaning than cold water. Hot water, by definition, has faster moving molecules than cold water. (The molecular speed translates into heat.) All other

things being equal, faster moving molecules do a better job of cleaning than slower moving molecules (in "displacing" the dirt and transporting it away using water.

At higher temperatures, many chemical reactions take place faster. This is because temperature as a measure of the average kinetic energy of molecules, and a higher temperature means that more of the molecules will have an energy greater than the activation energy requirement of a particular reaction.

(There's a common misconception that it's because the molecules in the water hit the items to be cleaned faster, but this only explains a tiny part of the speed change - the majority, as per the Maxwell-Boltzmann equations is the effect in the paragraph above.)

In the specific case of biological detergents between 100f and 150f, the numbers pretty much pan out to mean that a 50F increase in temperature roughly doubles the rate of reaction. Which is why, for the types of stains that detergents deal with, washing for 1 hour at 110f is the equivalent of washing for 2 hours at 150f.

Looking at soap is a step in the right direction. Soap's effectiveness doesn't come by increasing solubility, though, but by acting as a surfactant. It helps stabilize the interface between oil and water by decreasing surface tension--this means it's easier to form clumps of oil in water. (Lower surface tension makes it less energetically costly to add another unit area of interface, so more interface area can exist.) It's not a matter of individual water molecules suddenly finding it easier to drag away individual lipid molecules.

Which brings us to our real answer. The surface tension of water decreases with an increase in temperature. By using hot water, the physical energetics make it easier for water to pull away chunks of oil. Secondly, the lower surface tension also makes it easier for the water to get into pores and fissures, instead of bridging them.

A word about Lanolin

-also known as....Adeps Lanae, wool wax, wool fat, anhydrous wool fat or wool grease

For the record, there is only one type of lanolin. It is the greasy sebum secreted by sheep's skin and it is absorbed into the fleece.

- Lanolin's function is to keep the fleece clean while also acting as a moisturizer.
- Lanolin helps to keep the sheep's skin dander-free and its locks lovely and healthy.
- Lanolin's ability to act as a waterproofing wax aids sheep in shedding water from their coats.
- Lanolin is a complex blend of oils, waxes, free fatty acids (which combine into oils) and lots of other stuff.
- This waxy substance is used in skin ointments and water-proofing wax.
- Some people like to spin wool without washing because of the lanolin and its softening properties.

A few interesting facts.....Crude lanolin constitutes approximately 5-25% of the weight of freshly shorn wool. Lanolin from one merino sheep can yield 8- 10 ounces !!!

The name given to the product 'Oil of Olay' is derived from the word "lanolin," which is a key ingredient in this popular product.

More Than Lanolin

But a fleece can also contain more than just lanolin. It most often contains a substance we call Suint. Suint is water-soluble sweat salts. Many fleeces we purchase may also contain tags (dung), plant matter, and dirt. We often find other things in the fleece, but we will not go into that now. Needless to say, these ingredients all combine with the lanolin and make different kinds of chemical bonds that do need to be washed or processed away.

The water-soluble bits are the easiest. Suint and dirt rinses out with cold water. But remember, cold water **will not** remove lanolin or for that matter, all of the dirt. You need to find a way to make the lanolin mix with the wash water and rinse away. This is the scouring process.

Being an old soaper - we know that making soap requires saponification. The meaning of saponification is adding an alkali to warmed fat- thus making soap. Being that soap is water-soluble, the fat will rinse away in wash water and also carry dirt and oils with it. Of course there is something called emulsification, which turns the oils into little globules that are suspended in water based liquids, allowing them to be washed away with a surfactant or detergent. Putting these things into practice, I used to notice that adding soda ash to my water was a strong enough alkali to saponify lanolin. The problem I found was protein fibers could be damaged in alkali conditions. After speaking with a chemist and also trial and error, I realized that wool is coated and protected by the lanolin. The wool was not damaged by the high pH until all of the lanolin dissolved. With hot water, a higher pH and shorter washing times - I was able to avoid any damage to the wool. I find that 20 minutes is plenty of time to do this. I do not use soda ash any more, but we do use a **good detergent** and **LOTS OF IT** in the 1st wash!!!!

Without getting into a long and drawn out college paper, I want to tell you that a neutral pH cleaner is better than a high pH cleaner. Years ago a friend of mine gave me some Sodium Laurel Sulfate (Orvus is another word for this). I tried it to wash wool and found it does not work at all. It was originally formulated to make suds, and though most people equate suds with cleaning, it is not something I would use to wash greasy, waxy wool. I know I used to explain to customers of our soap that suds do not mean clean. It just means suds and bubbles.

Because lanolin is grease, it dissolves best in very hot water and generous amounts of detergent. Think of washing a butter dish. Can you use cold water to get the grease off of the dish? How about just soap? I know the best way for me is to use hot water and soap to get that grease off of my butter dish.

If temperatures are lowered during the washing process, it can make the lanolin re congeal and make a stickier substance that is more difficult to wash out. Believe me- you do not want to battle this one. Remember - **HOT HOT HOT** is the solution here!!!! This is imperative throughout the entire washing process. No hot- warm and cold!!! The only time you may want to soak a fleece in cold water is before washing to remove and soften mud and dirt from the fleece. You can soak a fleece overnight in cold water before washing.

Llama, alpaca, and some other exotic fibers do not contain lanolin and, while easier to clean than sheep wool and mohair, you should not underestimate the value of cleaning these fibers.

We suggest you wash your fleece as soon as possible after shearing because the lanolin or wax in the fleece hardens with age. Though we have washed and processed older fleeces with no problems, not washing your fleece increases the likelihood of color changes in a white fleece, and increases the chance of the fermentation of organic matter. We have experienced a few fleeces with fermenting VM matter and pew.... it takes a long time to rid the fiber of this stick! A raw fleece is also more likely to attract moths than a clean one.

A word about your cleaning agent

This is a topic that everyone has an opinion on. Many tell you one brand or another. We will not tell you what brand to use, but give you some food for thought so that you might be able to make up your own mind. We always use Dawn.

- Shampoo will not work for wool washing. It isn't strong enough. Keep it for washing your hair or the dog's.
- Dishwashing detergents like Dawn, Joy, etc., have some good grease cutters. The problem is they can be expensive. They also contain **a lot of foaming agents** and can be very hard to rinse out. This in itself is not bad, as soap is a natural moth deterrent.
- Laundry detergents can be beneficial. The liquid ones are based on surfactants. Laundry powders are generally based on alkalis and soaps rather than surfactants. And some laundry products are mixtures of the 2. Some detergents contain "optical whiteners". They are safe and will rinse away the next time you wash the wool.
- **Oxyclean or oxygen cleaners are things to avoid at all costs!** I called the Oxyclean company years ago and found out it contains blend of enzymes to attack protein-based stains on cellulose fibers. Because wool is a protein, these enzymes read the fiber as a stain and starting to eat it! If left over time, it would dissolve the fiber- then what would you have to spin??? :-)

The bottom line

- Use a good detergent and lots of it.
- Minimize the wool's exposure to the high-pH scouring water once the lanolin has dissolved from the wool. Bath temp's at 150°F for 15-20 minute soaks until the wool is clean. We find 2 times is usually enough.
- Hard water requires more soap, or try adding a little bit of salt, like they use in a water softener.
- Alkaline pH assists in the opening up of wool, but use caution and move the fibers quickly.
- Avoid any that contain perfumes and oxygen cleaners.
- **Do not use products containing conditioners and do not add conditioner to your rinse !** Conditioners leave a residue on fiber which, over time or when exposed to heat, become sticky and cause nepping and noiling when being carded, and we know you do not want that in your roving or yarn. If conditioners are added to the rinse water most processors we know will have to rewash your fibers!!! We are no exception!
- Questions or comments??? Give us a call or e-mail us! We promise not to BITE!

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801.487.8372 1640 S. 600 E SLC, UT 84105
email: lynn@spinderellas.com