



Tanning & Processing Manual: A Living Document
(Because Every Hide Is Unique)

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Equipment Checklist

Pre-Operation Equipment Checklist & Inventory (fillable copy inside trailer door)

Welcome to **The Rugged Ranger Mobile Tannery**. Before beginning any hide processing, please use this checklist to verify that all tools and materials are on board, in working order, and properly maintained.

1. Personal Protective Equipment (PPE) & Safety

- ☐ **4 pairs** Safety Gloves (chemical/water-resistant)
- ☐ **4 pairs** Protective Goggles
- ☐ **2 boxes** Ear Plugs
- ☐ **4** Heavy-Duty Waterproof Aprons
- ☐ **1** First Aid Kit

2. Water, Power & Setup Infrastructure

- ☐ **3,300 PSI Pressure Washer**
- ☐ **Propane / Gas Tank** (for pressure washer/cookpot burner)
- ☐ **150-Gallon Water Tank**
- ☐ **2** Heavy-Duty Outdoor Extension Cords

3. Fleshing & Preparation Equipment

- ☐ **Fleshing Machine + 4 extra fleshing discs**
- ☐ **Fleshing Beam & Stand**
- ☐ **Industrial Immersion Blender** (for brain/solution prep)
- ☐ **4-Gallon Heavy Cookpot** (for brain/fat liquor prep)

4. Tanning & Tumbling System

- ☐ **Tanning Tumbler Engine/Frame**
- ☐ **2 Tumbler Barrels** (*Note: Keep 1 dedicated for wet tanning/washing and 1 dedicated exclusively for dry softening with sawdust*)

- ☐ **Digital Scale** (for measuring vegetable tanning extracts)
- ☐ **Measuring Cups & Graduated Cylinders**
- ☐ **Digital pH Meter** (verify calibration before testing bath levels)
- ☐ **Digital Thermometer** (tanning liquors can ruin hides if poured too hot—especially brain baths or vegetable tannins above 90–95°F!)

5. Stretching & Drying Gear

- ☐ **3 Adjustable Hide Stretching Racks** (*suitable for calf to large bull hides*)
- ☐ **12 Heavy-Duty Hide Clamps**

6. Softening, Grooming & Finishing Tools

- ☐ **3 Wire Carding / Grooming Brushes**
- ☐ **Heavy-Duty Leather Punch**

7. Tanning Ingredients & Consumables Inventory (also inside trailer door)

Important Note on Consumables: Consumables are shared among all borrowers. Please log your starting levels on the Checkout Sheet and record what you use.

- ☐ **Vegetable Tannins** (Chestnut, Quebracho, Mimosa, or Bark extracts)
- ☐ **Salt** (fine-grain non-iodized for curing/pickling)
- ☐ **Lanolin Oil**
- ☐ **Neatsfoot Oil**
- ☐ **Castile Soap**
- ☐ **Citric Acid**

Important Notes & Rules for Borrowers

1. Consumable Usage & Reorder Log

Because *The Rugged Ranger* is a shared community resource, **maintaining our inventory is essential.**

- Please log all chemicals and oils used (in pounds, ounces, or cups) on the **Consumables Sheet** attached inside the trailer door.

- If any ingredient (salt, tannin, oils, acid, soap) drops below **25% remaining capacity**, note it immediately on the log or text the Uncompahgre Farms coordinator so replacement stock can be ordered for the next borrower (especially the fleshing discs please, they take a long time to come in!).

2. Trailer Return & Sanitation Standard

- **Clean & Dry:** All tools (fleshing blades, beams, immersion blenders, cookpot, and clamps) must be thoroughly pressure-washed, disinfected with Castile soap, and **fully dried** before packing away to prevent mold and rust.
- **Tumbler Separation:** **Never** put wet hides or tanning liquors into the designated *Dry Softening Barrel*.
- **Fuel & Power Check:** Please top off the pressure washer gas tank prior to returning the unit to Montrose or passing it off to the next ranch.

Cow Hide Tanning

PHASE 1: Raw Hide Curing & Preservation

Step 1: Fresh Hide Trimming & Initial Wash

Goal: Remove surface manure, blood, and mud; trim non-usable sections.

Procedure: Lay fresh hide hair-side down on a flat surface or inclined deck. Wash hair thoroughly with cold water. Trim off tail bones, lower legs below knee joints, and ragged, paper-thin belly edges.

Step 2: Salting & Curing

Goal: Dehydrate hide tissue, set hair roots, and preserve tissue against bacterial decay.

Proportion / Quantity: ~15–20 lbs of non-iodized coarse white salt (fine mixing or solar salt) per full-size cowhide (approx. 1 lb salt per 1 lb wet hide weight).

Procedure: Lay hide flesh-side up on an inclined pallet or slatted plywood table to allow liquid drainage.

Spread salt evenly across every square inch of the flesh side, ensuring thick coverage on edges and folded flaps.

Allow hide to drain for 48–72 hours.

Scrape off wet, dirty salt. Apply a fresh layer of dry salt (10–15 lbs) and leave for an additional 2 to 3 days until hide is firm and dehydrated.

PHASE 2: Rehydration & Two-Stage Fleshing

Step 3: Washing & Rehydration

Goal: Remove residual salt and restore hide collagen to a soft, pliable state suitable for fleshing.

Procedure:

Option A (Rotary Tumbler Wash): Load salted hide into rotary tumbler drum. Fill with 15–20 gallons of cold water. Tumble at 8–12 RPM for 30–45 minutes. Drain dirty water.

Option B (Static Tub Soak): Submerge hide in a 55-gallon drum or large wash tub filled with cold water for 4–8 hours, agitating manually every hour.

Step 4: Primary Fleshing (Coarse Tissue Removal)

Goal: Remove heavy fat deposits, muscle tissue, and blood pockets.

Option A: Pressure Washer (Fastest / Mechanical)

Equipment & Specs: Pressure washer rated at 2500–3300 PSI.

Nozzle Options:

25° Green Nozzle: Standard choice for main body, thick neck, and spine.

40° White Nozzle: Lower-impact choice for delicate flanks, bellies, and skirt edges.

Safety Gear: Waterproof suit, full-face shield, rubber steel-toe boots, ear protection.

Procedure: Secure hide flesh-side up on an inclined plywood deck (45° incline), securing top edge with clamps or a wooden batten strip.

Hold spray wand at a 30°–45° angle relative to the hide surface (never perpendicular, as 90° pressure will blast holes through the hide).

Maintain a distance of 6–12 inches from the hide. Spray with sweeping downward strokes from center line toward outer edges.

On thin belly or flank sections, back off wand to 12–15 inches or switch to the 40° White Nozzle.



Step 5: Secondary Detailing & Membrane Stripping

Goal: Strip away tight inner membranes, gristle, and stubborn fat pockets to allow tanning oils/tannins to penetrate fully.

Option A: Handheld Fleshing Machine

Procedure: Drape rehydrated hide over a curved wooden fleshing beam; clamp securely.

Hold machine at a shallow, near-parallel angle to the hide surface.

Pass rotating blades down the beam in smooth, controlled overlapping strokes.



Option B: Handheld Fleshing Knife (Traditional Manual)

Equipment: Dual-handled curved fleshing knife (push-knife) with one dull edge (scrapers) and one moderately sharp edge (cutters).

Procedure: Position hide over a smooth, convex wooden fleshing beam fitted to your hip height.

Push Stroke (Dull Edge): Lean body weight into the knife handles, pushing downward away from yourself at a 30° angle to scrape off soft fat and water.



Cut Stroke (Sharper Edge): For tough gristle along the neck and spine, angle the cutting edge flat against the hide surface to slice away thin layers of dense membrane without gouging the hide underneath.

PHASE 3: Pickle & Conditioning (pH Control)

Goal: Lower internal pH of hide to open collagen fibers, neutralize bacteria, and prepare fibers for oil or tannin absorption.

1. When Pickling IS Necessary (Do Not Skip)

- **Raw Hides Stored Long-Term or Prone to Slip:**

- If the hide was sitting around for a bit before processing, or if ambient temperatures are warm, pickling kills decay-causing bacteria and locks the hair roots in place to prevent **hair slip** (where the fur/hair falls out in clumps).
- **Thick, Dense Hides (Bull or Older Cow Neck/Spine):**
 - Thick hides have dense collagen bundles. The acid in the pickle swells and opens up these fiber bundles, allowing tanning oils or acids to penetrate to the center of the hide easily.

2. When Pickling IS NOT Necessary (Okay to Skip)

- **Fresh or Well-Cured Hide Being Brain / Soap-and-Oil Tanned Immediately:**
 - Traditional brain tanning or natural oil/soap tanning **does not require an acid pickle** if the hide is fresh, clean, and properly rehydrated.
 - **How it works instead:** Brains, egg yolks, or soap-oil emulsions rely on emulsified fats physically coating raw collagen fibers while you break/stretch the hide as it dries. As long as the hide is thoroughly fleshed and membrane-free, the oil emulsion will penetrate fresh hide fibers without needing an acid to open them up first.
- **Hair-Off / Buckskin (Lye or Lime Dehairing):**
 - If you are making hair-off buckskin or rawhide and using an alkali process (wood ash, lye, or hydrated lime) to remove hair, you don't pickle before oiling. Instead, you "delime" (rinse thoroughly with water or a mild vinegar rinse to bring pH back to neutral ~7.0) before applying brains or oils.

3. When You Should NEVER Pickle (Skip It Completely)

- **Vegetable / Plant Tannin Tanning (Oak Bark, Chestnut, Mimosa):**
 - **Do not put a strongly pickled hide (pH 2.0–2.5) directly into a vegetable tannin bath.**
 - **Why:** Plant tannins natural pH sits around **4.0 – 5.0**. If a hide is too acidic (pH 2.0) when it enters the bark bath, the high acid content causes the plant tannins to precipitate out of solution or bind too rapidly to the exterior surface, sealing the outside and preventing the bark liquor from tanning the middle.

- *Note:* If you did use an acid pickle to store a hide prior to veg tanning, you **must** thoroughly neutralize/delime the hide back up to a pH of **4.5 – 5.5** before placing it in bark liquor.

Summary Guide

Tanning Method	Is Pickling Required?	Ideal Hide pH Range	Notes
Brain / Oil & Soap Tan	Optional	5.5 – 7.0	Skip if hide is fresh/clean and fleshed well. Pickling helps if hair slip is a concern.
Vegetable / Bark Tan	No (or Delime first)	4.5 – 5.5	Direct strong acid pickling causes case hardening in bark liquor.

Option A: Citric Acid Pickle (Safe Acid Option)

Proportions (per 10 gallons of water):

Citric Acid: ~1 to 1.5 lbs

Non-Iodized Salt: 8 to 10 lbs (1 lb salt per gallon of water to prevent hide swelling/acid burn)

Target pH: 2.0 – 2.5 (Measure using a digital pH meter or narrow-range pH strips).

Procedure:

Dissolve salt completely in water, then stir in citric acid until dissolved.

Submerge fleshed hide completely. Agitate hide thoroughly.

Check pH after 1 hour and adjust with additional citric acid if pH rises above 2.5.

Soak for 24–48 hours until hide is pickled through (cut a tiny strip from the thickest part of the neck; cross-section should look uniform and opaque white).

Option B: Neutralization Rinse (Required After Acid Pickling)

Proportions (per 10 gallons of water):

Baking Soda (Sodium Bicarbonate): 1/2 cup (approx. 4 oz)

Target pH: 5.0 – 6.0

Procedure: Stir baking soda into water. Submerge pickled hide for 20–30 minutes to neutralize excess surface acid, then wring out excess liquid before moving to the dressing phase.

PHASE 4: Tanning & Dressing Application (3 Alternative Methods)

METHOD 1: Brain Tanning (Emulsified Fat Dressing)

Proportions:

Fresh/Thawed Animal Brains: 2 to 3 lbs per full hide

Water: 3 to 5 gallons warm water (100°F–110°F / 38°C–43°C)

Procedure: Simmer brains in 1 gallon of water for 15 minutes until firm. Blend thoroughly until smooth; strain through mesh screen.

Mix blended brain paste into warm water to create a milky liquor.

Application Options:

Option A (Rotary Tumbler): Load damp hide into tumbler, pour in brain solution, seal tightly. Tumble at slow speed for 45–60 minutes. Wring out hide over a post, return to tumbler, and tumble with remaining liquor for 30 minutes.

Option B (Manual Penetration): Place hide in a tub with brain liquor. Knead, massage, and work solution into hide by hand for 60–90 minutes.

METHOD 2: Natural Oil & Soap Dressing (Alternative to Brains)

Proportions:

Pure Neatsfoot Oil or Lanolin Oil: 1 quart (32 fl oz)

Natural Soap (Bar soap grated / Castiles or pure liquid soap): 1 lb bar soap or 16 fl oz liquid soap

Warm Water: 2 to 3 gallons (110°F–120°F / 43°C–49°C)

Procedure: Melt grated soap in 1 gallon of hot water until completely dissolved.

Slowly pour neatsfoot oil or lanolin oil into soap water while stirring vigorously or using a paint mixer attachment on a drill to create a thick, stable emulsion (creamy white mixture; oil should not separate on top).

Mix emulsion into remaining warm water.

Apply warm oil/soap emulsion thoroughly to the flesh side of the hide using a stiff brush, or work inside the rotary tumbler for 45–60 minutes.

METHOD 3: Plant / Vegetable Tannin Bath (Oak Bark / Tree Tannins)

Proportions & Preparation:

Crushed Oak Bark / Mimosa / Chestnut Powder: ~20–30 lbs dry shredded bark per hide.

Water: 30–40 gallons.

Target pH: 4.0 – 5.0

Procedure: Boil crushed bark in water for 2–3 hours to extract liquid tannins. Strain out solids.

Bark Bath Progression:

Weak Liquor (Days 1–3): Dilute tannin extract with water to a pale brown color (approx. 1–2% tannin concentration). Soak hide for 3 days, stirring daily. (Starting in a liquor that is too strong will cause "case hardening," locking tannins on the surface and preventing core penetration).

Medium Liquor (Days 4–8): Add more concentrated bark extract to darken liquor to a medium brown tea color.

Strong Liquor (Days 9–21+): Increase extract concentration to deep dark brown.

Completion Test: Slice a small sliver from thickest neck edge. The cross-section must be entirely brown with no white line remaining in the center core.

PHASE 5: Softening, Break-Drying & Finishing

Step 6: Break-Drying & Softening

Goal: Continually flex collagen fibers as moisture evaporates, preventing hide fibers from bonding together stiffly.

Option A: Dry Rotary Tumbler (Mechanical Softening)

Procedure: Drain tumbler drum completely and wipe dry.

Load damp, dressed hide into tumbler drum along with 4–6 smooth wooden pegs or clean tennis balls to increase internal friction.

Run tumbler on slow speed until hide is completely dry, soft, and flexible (2–6 hours depending on ambient humidity).

Option B: Manual Staking & Cable Pulling (Handheld Method)

Equipment: Wooden staking blade (dull crescent-shaped metal/wooden blade mounted upright) or a clamped 1/2" stainless steel wire cable.

Procedure: As hide air-dries, grip hide with both hands and pull flesh side firmly back and forth across the edge of the staking blade or taut cable.

Work every square inch of the hide systematically until dampness is gone and hide turns soft and white/pale.

Step 7: Smoking (Fixing Brain / Oil Tans)

Goal: Chemically bond aldehydes in wood smoke to oil-treated fibers, rendering softness permanent and water-resistant. (Note: Omit this step for Vegetable Oak Bark Tanned hides).

Fuel: Cool-burning smudge fire using rotten hardwood ("punk wood"), hardwood sawdust, or corn cobs. Avoid resinous softwoods (pine/fir) which leave sticky pitch.

Procedure: Suspend dry hide into a cone shape or chimney structure over smudge cooker.

Funnel cool wood smoke (under 120°F) into hide chamber for 2–4 hours per side until hide takes on an even golden-amber tone.

Step 8: Sawdust Tumbler Polish & Hair Cleaning

Proportions: 1–2 5-gallon buckets of dry hardwood sawdust (oak, maple, or birch; avoid pine/cedar).

Procedure: Place dried, smoked hide into tumbler drum with hardwood sawdust.

Tumble for 20–30 minutes at slow speed. Hardwood sawdust absorbs surface oils and sweeps out dust, debris, and loose hair.

Remove hide, shake thoroughly, and brush out fur using a wire carding brush or steel comb.

Sheepskin Tanning

Phase 1: Preparation & Wool Washing

*Sheep wool contains natural lanolin, dirt, and manure. Cleaning the wool **before** tanning is essential to ensure tanning liquors reach the hide skin and to prevent staining.*

Step 1.1: Trimming & Rough Fleshing

- **Tools:** Handheld fleshing knife or fleshing beam / flat table.
- **Process:** Trim away jagged edges, tail remnants, or heavily soiled wool around the edges. Carefully scrape off large meat or fat chunks.
- *Note:* Do not use the power fleshing machine yet if the wool is heavily tangled or greasy, as it can snag thin sheepskin.

Step 1.2: Wool Washing & Degreasing

- **Tools:** Pressure washer (low setting / fan nozzle) or large wash tub, Castile soap.
- **Process:**
 1. Fill a tub with lukewarm water (never hot, or the wool will felt) and a generous amount of pure **Castile soap**.
 2. Submerge the hide wool-side up and gently agitate with your hands.
 3. Use the **pressure washer** on a low-pressure wide fan tip (held 12–18 inches away) to spray clean water through the wool from neck to tail, flushing out dirt and grit.
 4. Squeeze (don't wring) excess water out of the wool.

Phase 2: Fine Fleshing & Membrane Removal

Sheep hides have a thin red/pink meat membrane layer that must be removed so tanning agents can enter from the flesh side.

Step 2: Fine Fleshing

- **Tools:** Fleshing machine OR handheld fleshing knife on a curved beam.
- **Process:**
 - Lay the hide flesh-side up.

- Work carefully from the spine outward toward the edges. Sheepskin is significantly thinner than cowhide, so use light, even pressure to avoid slicing through.

Phase 3: Pickling (Optional vs. Recommended)

- **Is Pickling Necessary for Sheepskin?**
 - **Highly Recommended** if using **citric acid** prior to fatliquoring/oil tanning or if the hide was fresh and you want to lock the wool roots in tight to prevent wool slip.
 - **Skip** if going directly into a vegetable/bark tanning bath (or keep pickle very mild at pH 4.5–5.0).

Step 3: Citric Acid Pickle (If Pickling)

- **Materials:** Citric acid, non-iodized salt, water, pH strips.
- **Ratio:** ~1 cup salt + 1–2 tbsp citric acid per gallon of water (target pH: **2.0 – 2.5**).
- **Process:** Submerge the sheepskin for 24–48 hours. Stir occasionally. Check pH to ensure it stays below 3.0. Rinse thoroughly before moving to the next phase.

Phase 4: Tanning & Softening Options

Select **one** of the following primary tanning methods based on your target finished hide style.

Option A: Soap, Lanolin & Neatsfoot Fatliquor (Softest Wool-On Pelt)

Best for bed overlays, rug pelt, or garments. Utilizes sheepskin's natural compatibility with lanolin.

- **Ingredients:** Castile soap, lanolin oil, neatsfoot oil, warm water.
- **Recipe:**
 - Melt 1 part Castile soap, 1 part lanolin oil, and 1 part neatsfoot oil in 4 parts warm water to create a stable emulsion.
- **Process:**
 1. Towel-dry or tumble (wool-only cycle) the wet, fleshed hide until damp.
 2. Paint the warm fatliquor mixture evenly onto the **flesh side** only (avoid saturating the wool).

3. Fold flesh-to-flesh and let rest overnight in a plastic container or bag to absorb.
4. **Breaking / Softening:** As the flesh side dries over 1–3 days, pull, stretch, and stake the hide over a rounded wooden edge or dull blade until the skin turns white, soft, and completely dry.

Option B: Oak Bark / Vegetable Tannin (Durable, Firm Leather Backing)

Best for heavy-duty rugs or saddle linings. Note: Bark liquor will dye white wool a golden/tan color.

- **Ingredients:** Oak bark powder/extract, water.
- **Process:**
 1. Prepare a weak tea/bark liquor bath (pH ~4.5–5.0).
 2. Submerge the sheepskin. Gradually increase bark strength over 5–10 days until the tannin fully penetrates the center layer of the hide skin (slice a tiny corner to check for a dark tannin line all the way through).
 3. Rinse thoroughly, wring gently, and apply a light coat of neatsfoot oil to the flesh side while damp.
 4. Break/stake as it dries.

Option C: Brain Tanning (Traditional Soft Pelts)

Best for traditional, highly breathable, velvety pelts.

- **Ingredients:** Cooked and mashed animal brains + warm water (emulsion).
- **Process:**
 1. Work the warm brain mixture thoroughly into the flesh side of the damp hide.
 2. Roll up and let sit in a cool spot for 6–12 hours.
 3. Stretch, pull, and work the hide over a staking tool continuously as it dries.
 4. *(Optional)* Smoke the flesh side over cool wood smoke to set the brain oils against moisture.

Phase 5: Drying, Tumbling & Wool Carding

Step 5.1: Tumbling (Softening & Wool Fluffing)

- **Tools:** Tumbler (wooden or drum tumbler).
- **Process:**
 - Once the hide skin is mostly dry and broken, place the sheepskin into the tumbler with dry hardwood shavings or tennis balls for 1–2 hours.
 - This buff-softens the skin side and fluff-separates the wool fibers.

Step 5.2: Wool Carding & Combing

- **Tools:** Carding brushes or wire dog slicker brushes.
- **Process:**
 - Lay the dry pelt flat.
 - Gently brush the wool starting from the tips and working down to the roots to remove any lingering burrs, mats, or tangles, giving the wool a plush, cloud-like loft.

Quick Reference Summary Table

Phase	Main Goal	Key Tools / Materials	Critical Precaution
1. Wash	Remove dirt, grease & dirt	Castile soap, pressure washer	Do not use hot water (causes wool felting).
2. Flesh	Remove pink meat membrane	Handheld fleshing knife or machine	Use lighter pressure than cowhide (thin skin).
3. Pickle <i>(Optional)</i>	Prevent wool slip / open fibers	Citric acid, salt	Neutralize if moving into a bark tan bath.
4. Tan/Fatliquor	Preserve & lubricate fibers	Lanolin/Neatsfoot or Bark or Brains	Apply oils to flesh side only; keep off wool.

Phase	Main Goal	Key Tools / Materials	Critical Precaution
5. Finish	Soften skin & fluff wool	Tumbler, carding brushes	Keep stretching until 100% dry to prevent stiffness.

Lessons Learned and Troubleshooting

Tanning is a dynamic balance of chemistry, microbiology, and physical force. When something goes wrong, identifying the root cause quickly can save a hide from total loss. Use this guide to diagnose, treat, and prevent common processing issues.

1. Equipment & Machinery Troubleshooting

A. Power Fleshing Machine Issues

- **Problem: Machine is cutting, tearing, or leaving "chatter marks" on the hide.**
 - *Root Cause:* Blade pressure is too aggressive, the angle of approach is too steep, or the hide is bunching up over the beam.
 - *Correction:*
 - Reduce pneumatic or hand pressure against the blade cylinder.
 - Ensure the hide is pulled smooth and taut with no folds before contacting the blade.
 - For thinner pelts (sheep, calf), switch to manual handheld fleshing knives or light-contact passes.
- **Problem: Flesh or fat is smearing rather than cutting clean.**
 - *Root Cause:* Dull blades or fatty tissue is cold/greasy.
 - *Correction:* Sharpen the helical blades. Warm cold hides slightly or wash greasy hides with warm water and Castile soap prior to fleshing.

B. Tumbler & Softening Drum Issues

- **Problem: Wool felting or matting inside the tumbler.**
 - *Root Cause:* High heat, excess moisture remaining in the wool, or tumbling too aggressively for too long.
 - *Correction:* Ensure the pelt is **damp-to-touch on the flesh side, but completely dry in the wool** before tumbling. Run on a no-heat/cool air setting only with dry hardwood sawdust or rubber/tennis balls.
- **Problem: Skin side remains stiff after tumbling.**
 - *Root Cause:* Hide was put in the tumbler too wet, or fatliquor/oil application was insufficient.

- *Correction:* The tumbler *assists* in breaking, but cannot replace manual stretching. Re-dampen the flesh side lightly with warm water/oil emulsion, allow it to penetrate, and stretch manually over a staking tool as it dries before re-tumbling.

2. Chemical, Liquid & pH Imbalances

A. pH & Acid Pickle Failures

- **Problem: Pickle pH keeps drifting upward above 3.0 during processing.**
 - *Root Cause:* Hides absorb acid as they pickle, and alkaline proteins or residual water neutralize the solution.
 - *Correction:* Test pH twice daily using calibrated digital pH meters or narrow-range pH strips. Add small dissolved doses of **citric acid** to pull the solution back into the target **2.0–2.5 pH range**.
- **Problem: Salt ring or crystal crusting on dried flesh side.**
 - *Root Cause:* Excessive salt concentration in the pickle/bath or inadequate rinsing prior to drying.
 - *Correction:* Wipe the flesh side down with a damp cloth to dissolve surface salts. Adjust future pickle baths to ensure salt is fully dissolved before submerging hides.

B. Vegetable Tannin (Bark) Issues

- **Problem: "Case Hardening" (Outside layer is dark brown/tanned, but middle layer is raw/white/rotten).**
 - *Root Cause:* Starting the hide in a tannin liquor that was too strong, or putting a strongly acidic pickled hide (pH < 3.0) directly into bark liquor without neutralizing.
 - *Correction:*
 - **Prevention:** Always start vegetable tanning in a **very weak/pale bark tea** and gradually add stronger liquor over days.
 - **Fix if pickled:** Neutralize pickled hides with a mild water wash to bring the hide pH up to **4.5–5.5** before entering the bark bath.

C. Fatliquor & Oil Penetration Issues

- **Problem: Oil sits on the surface of the flesh side and feels slimy or greasy without soaking in.**
 - *Root Cause:* The hide was too dry when oil was applied, or the fatliquor emulsion broke (oil and water separated).
 - *Correction:* Fatliquors (neatsfoot oil + Castile soap, or brain solutions) require water as a carrier. Lightly mist the flesh side with warm water to open the fibers *before* painting on the fatliquor, or re-emulsify the mixture with warm water and soap.

3. Hide Condition & Microbiological Issues

A. Hair/Wool Slip (Hair Pulling Out in Clumps)

- **Problem: Fur or wool comes off easily when pulled.**
 - *Root Cause:* Bacterial decay at the hair root caused by heat, delayed processing, or lack of salt/acid.
 - *Correction:*
 - **Immediate Action:** Submerge the hide immediately into a strong, cold salt pickle (pH 2.0 with citric acid + high salt concentration) to kill bacteria and lock the remaining hair roots.
 - **Prevention:** Flesh, wash, and salt/pickle raw hides within hours of harvest or slaughter. Keep wash tubs cool.

B. Greasiness & Odor in Wool / Flesh

- **Problem: Sheepskin smells rancid or feels heavy and oily after drying.**
 - *Root Cause:* Unremoved animal fats (lanolin or subcutaneous fat) oxidized on the hide.
 - *Correction:*
 - Wash wool thoroughly in Phase 1 with warm water and pure **Castile soap**.
 - For stubborn grease spots on sheepskin, spot-clean the flesh and wool with liquid Castile soap and warm water, flush with a low-pressure fan spray, and re-dry while stretching.

4. Quick Reference Troubleshooting Matrix

Symptom	Primary Suspect	Quick Remedy
Flesh side dries hard as cardboard	Dried without enough stretching / insufficient fatliquor	Lightly re-wet flesh side with water/oil emulsion; stretch over staking blade continuously until dry.
White wool turned yellow/brown in bark tan	Bark liquor contacted wool	Keep tannin bath weak, or restrict veg tanning to hair-off hides / coat wool heavily with protective guard grease if soaking.
Hide is slimy/smells foul in pickle	pH is too high (> 3.5); bacteria growing	Add citric acid immediately to drop pH to 2.0–2.5; add salt to increase salinization.
Tears along the flanks during fleshing	Excessive blade pressure on thin skin zones	Avoid high-pressure passes on flank/belly areas; finish thin edges by hand knife.
Wool feels matted or bunched	High heat drying or untangled wet wool	Card wool thoroughly with wire carding brushes while slightly damp, then tumble cold.

5. Standard Quality & Safety Checklist

Before committing any hide to the final drying rack, verify:

1. **pH Verification:** Has hide skin pH been brought back to a stable, non-acidic finish (pH 4.5–6.0) unless using acid-lock fatliquoring?
2. **Flesh Inspection:** Are all membrane sheets and fat pockets completely removed to allow 100% oil/tannin penetration?
3. **Wool/Hair Cleanliness:** Is wool/hair rinsed clear of grit, manure, and loose salts that could degrade machinery or carding brushes?