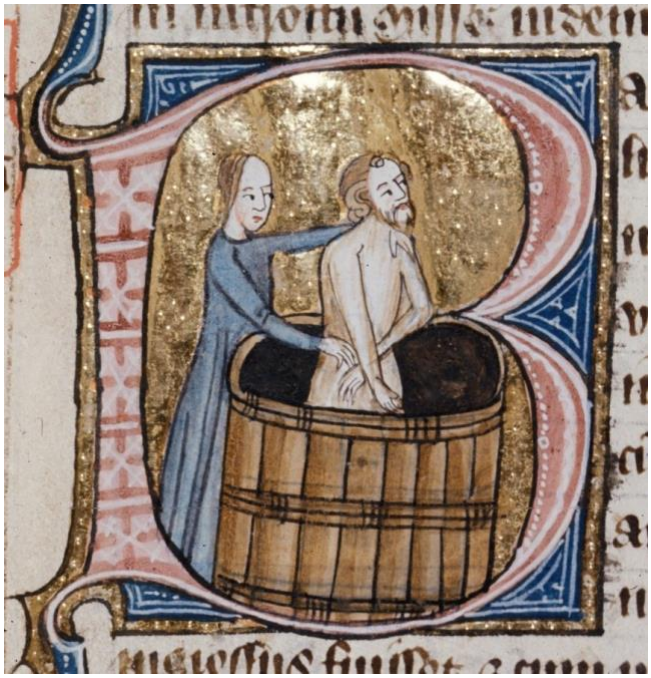

A TRIO OF SOAPS

Or how to turn your kitchen into a chemistry lab.

QUICK FACTS

- Soap made from olive oil, lard, beef tallow
- Commercial lye (NaOH)
- Home rendered lard
- Hot process: Period method
- Cold process: Possible with modern materials

Lucia de Moranza
Ealdormere KA&S AS 53

A trio of Soaps

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In my ongoing experimentation with new things, I finally decided to try my hand at soap making. I decided, in my classic comparison fondness, to explore three different fats. Each was used exclusively in a soap to really get a handle on how each worked alone. I decided to use beef tallow, lard and olive oil, three plausibly period fats. I rendered the lard myself, but when presented with opportunity to buy rendered beef tallow and unrefined olive oil from a SCAdian (Mistress Elska á Fjárfelli) at Birka, I happily saved myself some time and bought those.

There is a great deal of evidence for soap making as a deliberate act rather than accidental happenstance in the SCA period, from mentions by Pliny the Elder (23 AD – 79AD) (Routh, Bhowmik, Parish, & Witkowski, 1996) to various mentions throughout the medieval period. (Blank, 1942).

At its most basic core, soap making involves taking a fat (specifically a triglyceride), and an alkali salt to produce a reaction called saponification. Triglycerides are made up of different fatty acids, and vary in both chain length (how many carbons in the chain) as well as the degree of saturation (how many alkaline bonds in that carbon chain), depending on the source of the fat. Alkali salts are most commonly lye (NaOH), potash (K_2CO_3), and soda (Na_2CO_3). Potash and soda are generally produced in medieval period from dripping water through plant ashes. What was burned determines if one gets potash or soda, with a general rule being inland plants (primarily wood ash) produces potash and coastal and marine high alkaline plants produces soda. (Konkol & Rasmussen, 2015) Modern lye (NaOH) wasn't produced until the late 1700s after a French chemist named Nicolas Leblanc refined the technique. ("Nicolas Leblanc - Chemistry Encyclopedia - water, gas, salt," n.d.) Soaps made using potassium (Potash) are generally soft or liquid soaps, and soaps made with sodium (soda or lye) are hard soaps.

While there were grand plans to extract my own lye from wood ash, I ran out of time to get that far. Instead, I used modern lye (NaOH) from the hardware store and a modern soap recipe calculator (www.soapcalc.net) to determine my ratios of fat to lye. I made a small batch of each, as this is just an experiment and I'd rather not have huge amounts of terrible soap if any of them are horrible. As such, I went for 300g of fat. I used the defaults in the recipe calculator (38% water, and 5% superfat).

Type	Weight of water	Weight of lye	Weight of fat
Olive Oil	114g	38.6g	300g
Lard	114g	40.2g	300g
Beef tallow	114g	40.6g	300g

All three of the calculation pages can be found in Appendix A.

I apologize for the lack of pictures, apparently whatever pictures I thought I'd taken through the process have vanished into the aether.

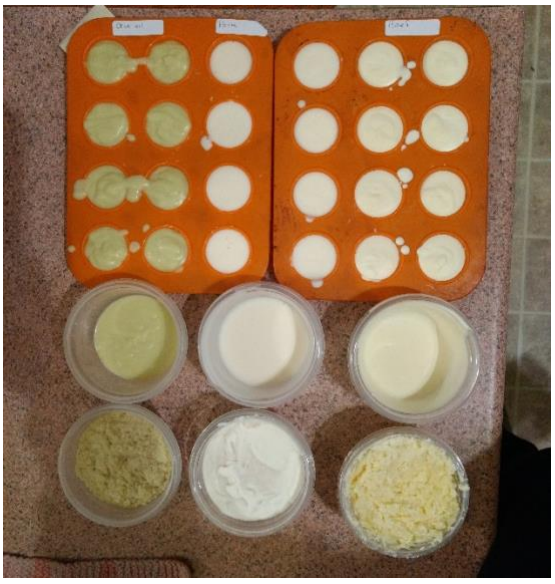
I warmed my solid fat until they melted in a crockpot, and (carefully!) added lye to water and waited for the two mixtures to settle to approximately the same temperature. Making a lye solution is an exothermic reaction, it becomes very warm. The lye was then added to the liquid fats in the crockpot and I mixed with a stick blender until it produced trace. (aka thick enough to leave trails, much like pudding.) This can be done stirring by hand, but in deference to an ongoing arm injury, I decided to indulge in modern technology as it takes quite a long time of stirring to get there.

None of the single fat soaps got to trace quickly, in comparison to mixed soaps I've made before. They all got there eventually, but it felt like forever.

At this point, half the batch was poured into molds to set as cold process soap. The other half stayed in the crockpot to be cooked down as hot process soap. Cold process soap takes 3 – 6 weeks to cure, allowing the saponification process to happen slowly over time. At this point, the soap is not yet soap, it's a greasy caustic goop that will eventually become soap. It is, however, very smooth and pourable (much like the pudding texture described earlier) and takes a mold shape perfectly.

Having only a half batch of what was a small batch of soap was not really ideal in my crockpot, but I gamely proceeded with cooking it down. Hot process forces the saponification through the addition of heat and renders soap that is usable basically right away. I do find that the soap improves for sitting for a few days, but that's as much to let it dry out as anything and settle a bit.

The hot process soap was stirred and cooked, and cooked and stirred until it got properly thick and lumpy, often described as 'mashed potatoes' in consistency. I overcooked the beef tallow one a bit, and it got very lumpy and rather dry, but all three of those were squished into plastic molds and left to sit.



Cold process soap in molds, hot process in bottom row.

L – R: Olive oil, Lard, Beef tallow

After about a week, the cold process soaps were turned out of the molds to have better air flow to help them dry.

Small soaps L – R: Olive oil, Lard, Beef Tallow

Large soaps Top – Bottom: Olive oil, Lard, Beef Tallow

The soap calculator provides a lot of interesting added ratings based on the different fats used, with some suggestions about what is optimal in a bar of soap. (http://soapcalc.net/info/SoapQualities.asp) These are based on the fatty acid contents of the fats in question and how those tend to indicate different soap qualities. The fatty acid numbers are also provided on the calculation pages. Diving into the details of the fatty acid distribution and the effects that has upon each soap is more detail than I wish to get into at this time (and more than I expect any of you wish to read), but a couple of points that caught my attention. The oleic acid is quite a bit higher in the olive oil (69) than either of the animal fats (pork 46, beef 36). It is associated with emollient factor, or how smooth and soft it feels on the skin. Stearic acid is higher in animal fats (pork 13, beef 22) and almost not existent in the plant fat (3) and it is associated with hardness of the soap bar and making a creamy lather. Creamy lather is the direct opposite of bubbly lather and the two are considered to be inversely proportional. Linoleic is also quite a bit higher in the olive oil (12) compared to the animal fats (pork 6, beef 3) and is also associated with emollient factor.

Based on these numbers, the olive oil soap should be quite soft, with no lather and very smoothing on the skin. The animal fat soaps are quite similar, producing a hard bar, with equally no lather, and moderate levels of conditioning on the skin. Having tried all three, I can confirm this to be the case, at least in general terms. There is not a bubble to be found from any of them, but they don't seem to dry out the skin as much as I feared they would. All three make perfectly adequate soaps, even if I'd really rather like some bubbles next time.

I hope to get to a comparison of different alkali salts soon, extracting my own lye from wood ash and hopefully trying the liquid soaps as well as further explorations in combinations of fats to get a soap that's just right.

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Appendix A: Soap calculations

SoapCalc © Recipe Name: Lard New INCI Names Print Recipe

Total oil weight	300 g	Sat : Unsat Ratio	45 : 55
Water as percent of oil weight	**38.00 %**	Iodine	57
Super Fat/Discount	5 %	INS	139
Lye Concentration	26.087 %	Fragrance Ratio	0
Water : Lye Ratio	2.8333:1	Fragrance Weight	0.00 g

	Pounds	Ounces	Grams
Water	**0.251**	**4.02**	**114.00**
Lye - **NaOH**	**0.089**	**1.42**	**40.24**
Oils	**0.661**	**10.58**	**300.00**
Fragrance	**0.000**	**0.00**	**0.00**
Soap weight before CP cure or HP cook		16.02	454.24

#	√	Oil/Fat	%	Pounds	Ounces	Grams
1	☐	Lard, Pig Tallow Manteca	100.00	**0.661**	**10.58**	**300.00**
Totals			100.00	0.661	10.58	300.00

Soap Bar Quality	Range	Your Recipe		
Hardness	29 - 54	42	Lauric	0
Cleansing	12 - 22	1	Myristic	1
Conditioning	44 - 69	52	Palmitic	28
Bubbly	14 - 46	1	Stearic	13
Creamy	16 - 48	41	Ricinoleic	0
Iodine	41 - 70	57	Oleic	46
INS	136 - 165	139	Linoleic	6
			Linolenic	0

Additives	Notes

Show Graph Hide Graph Print Recipe

The linked image cannot be displayed. The file may have been moved, renamed, or deleted. Verify that the link points to the correct file and location.