Wool Pellets

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There is a growing interest in converting low value wool into pellets for a natural fertilizer and soil amendment, but how did we get here? For 10,000 years we have been sustainably harvesting wool for clothing. We tend to forget that the US had fifty-six million head of sheep in the 1950's, dropping to only five million currently. In the 1950's, during the all-time market high for wool, polyester was first spun for clothing. In the 1990's, US wool mills were moved overseas to take advantage of cheap labor and lax environmental laws. Then in the early 2000's, consumer preferences switched to buying cheap polyester clothing that may only be worn once and is then discarded. In the 2020's, the Covid pandemic meant everyone worked from home and did not need business attire for online meetings. Recently, tariff disputes and currency fluctuations have disrupted supply chains and factory demand. For seventy years, synthetic fabrics have taken market share and hammered our once proud industry that clothed the world for 9,930 years. The regular consumer seems to have lost their amazement for this unbelievable fiber, but there seems to be a few early gusts of wind heralding a coming storm on polyester clothing. The mainstream media is finally linking the massive microplastic pollution in our water systems to all the plastic clothing and products consumers are using. It may not be this generation or the next, but at some point, the US public will realize what a gift we have been given having an animal that can graze weeds, reduce fire hazard, and produce meat, milk, and fiber in a truly sustainable way.

The current commercial market is almost exclusively for white, fine wool under twenty-two microns, under 1.5% veg contamination and with good yield and length. The US military has recently been purchasing wool again and we have had good demand for US made socks. We have almost no market for medium wool, coarse white wool, tags, and pieces. To convert this low value wool to pellets, the raw wool is pressed through a die heating the material to 160F which makes it weed-seed free. The same process we use to make alfalfa or wood pellets. The larger the press, the less need there is to preprocess the wool. The wool just needs to be opened or picked to allow feeding into the die on larger press systems. To use small (5hp) dies, the wool first needs to be free of burs and dung and then shredded before being pelleted. Pelleting can cost anywhere from $3.50 to $10 per

pound of finished product not including freight. The process is around 98% efficient, according to Albert Wilde, the third-generation sheep producer from Croydon, UT who holds the patent on using wool as a soil amendment. The reason Albert took out the patent was to keep this process closed to foreign companies who want to flood this new market with cheap foreign products. The Noyes family in Whitehall has also been making wool pellets for a couple of years through their Ranching Tradition Fiber business which also sponsors the Copper K Wool Festival each summer.

There actually has not been much published research on wool pellets. Albert has conducted extensive greenhouse trials and found that replacing 5% of the potting soil with wool pellets will reduce grow time of peppers from seed set to sale height. The exact components of wool pellets that produce these results have not been identified as wool pellets are not as nutrient dense as commercially available fertilizers.

Table 1. Wool pellets quality indicators(analysis bulletin Raiffeisen Laborservice)

No.	Quality Indicators	U. M.	Determined values
1	Dry matter	%	89.30
2	pH measured at 20,6 0C	pH units	9.56
3	Density	g/l	0.33
4	Nitrogen	% D.M	12.14
5	P2O5	% D.M.	0.18
6	K2O	% D.M	5.08
7	Sulphur	% D.M	2.11
8	CaO	% D.M	0.46
9	MgO	% D.M	0.19
10	Organic matter	g/kg D.M.	847.4
11	Humus–C	g/kg D.M.	460.4
12	Copper	mg/kg D.M	8.1
13	Iron	mg/kg D.M	2296
14	C:N ratio		3.8 :1

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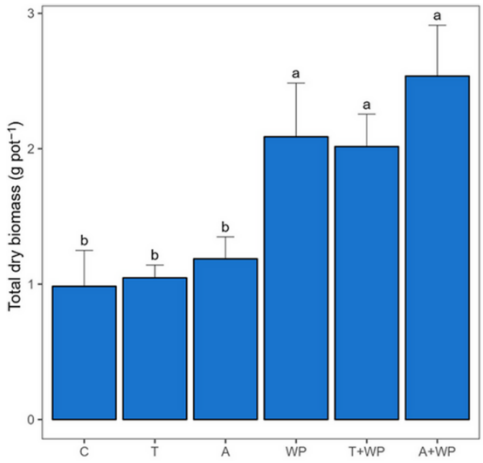
One of the interesting things about wool pellets compared to other natural or chemical fertilizers is they have an extremely low Carbon to Nitrogen ratio. High C:N ratios promote fungal growth and low C:N ratios promote bacterial growth. This low C:N ratio may stimulate naturally occurring soil microbes that in turn releases locked up nutrients and stimulate plant growth. As a comparison, here are the C:N ratios for wool-3.8:1, manure-15:1, leaves-60:1 and sawdust-500:1. In the spring of 2024, the Montana Wool Lab started some field studies with wool pellets applying replications of 0, 100 and 500 pounds per acre and looked at yield of annual forages. We did not find any yield differences, however the soil at the start of the season had twenty-five units of N available and an additional one hundred units of N was applied during the growing season. We will do soil samples again this spring to see if we can detect any differences in the soil characteristics.

Table 1. Laboratory analysis of two fertilizer products: wool pellets (Wild Valley Farm, Croydem, UT, USA) and Pro-Booster mixed fertilizer blend (North Country Organics, Bradford, VT, USA). Analysis conducted at the University of Maine Analytical Laboratory [32].

	Total N	Total C	C/N	P205	K2O	Ca	Mg
	%	%		%	%	%	%
Wool	9.54	41.6	4.36	0.05	4.07	0.580	0.411
Pro-Booster	9.89	23.1	2.58	1.44	1.42	0.886	0.300
	B	Cu	Fe	Mn	Na	Zn	
	ppm	ppm	ppm	ppm	%	ppm	
Wool	16.7	5.8	264	97.6	15.13	103	
Pro-Booster	13.0	14.7	714	70	5.62	90.3	

In 2022 Bradshaw and Hagen, compared wool pellets in Vermont to a local organic fertilizer and published the results in the Agronomy Journal (see table above) and in 2024, Kovacs et. al. studied the addition of wool pellets in combination with either fungal or nitrogen fixing bacteria inoculants on soil characteristics. (More efficient nitrogen utilization through wool pellet and soil inoculation. Kovacs et. al. 2024. Agrosystems, Geosciences and Environment. https://doi.org/10.1002/agg2.20534) The study used one-liter pots and only added one gram of wool pellet per pot. The results indicated a significant difference in mass of leaf produced regardless of inoculant, but no difference in water holding capacity at this rate. The combination of wool pellets and Trichoderma inoculation showed the highest microbial activity.



The new Montana Wool Research Lab continues to take shape. The expected move in date is February of 2026. We plan on hosting MWGA Summer Campout in June of 2026 to give producers a tour and discuss current research and management modifications across the sheep and wool program at MAES Ft. Ellis and Red Bluff. Hope to see you at this year's campout.