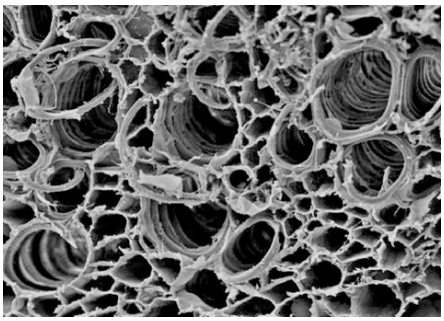
Soils low in organic matter, as seen in New Mexico are less resilient to drought and climate irregularities. Drought conditions have caused 49% of New Mexico's pasture and rangeland to be rated as poor or very poor, contributing to overgrazed pastures that rely on, limited water sources.

Biochar added to high desert soil significantly improves water-holding capacity, nutrient retention, and microbial activity. Its porous structure acts as a reservoir, holding 3–6 times its weight in water, reducing irrigation needs and nutrient leaching. This boosts plant growth and increases pasture productivity.



Amendments added to biochar infiltrate this highly porous structure creating a "charged" carbon matrix that makes nutrients accessible to soil microbes.

Unlike composts and manure incorporated into soil, which perform poorly in arid soils. Compost vanishes quickly in high desert soil primarily due to rapid **oxidation-driven decomposition** caused by extreme dryness and high temperatures which breaks down the carbon matter faster than the compost can be converted into a useable input.

Raw manure, high in salts and ammonia, when applied to low organic matter soil results in excessive salt level build-up, particularly if applied to the same, area and it then ties up nutrients plants rely on. By adding biochar to manure odor can be controlled and more nutrients retained before using the manure. This can be accomplished by adding biochar to stalls and pens and letting foot action integrate it into the manure.

In soil biochar creates a **reloadable carbon reef** that doesn't break down and disappear in soil and supports a microbial living system that a pasture would rely on for water, nutrient breakdown and uptake.

Overall, biochar is used as a soil amendment to promote better aeration, nutrient and water retention, and plant and soil health, which all enhance crop yield.

Small acreage means managing manure as a single horse can produce 9 tons of manure annually, that could exceed the land's capacity to integrate. Without source point pollution.