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THE BENEFITS OF A MANURE-BASED BIOCHAR

[Image of industrial equipment]
There are several potential markets for biochar.

However, the overwhelming majority of the research, production, and marketing has been done with wood-based biochars.

The 4 major areas that have shown proven results are:

- Soil amendment
- Feed supplement
- Water filtration and soil remediation
- Odor control
The value of biochar as a soil amendment can be evaluated by increased plant yields, as well as reductions in nutrient run off, irrigation costs, and fertilizer costs.

Wood based biochars have significant positive results; but manure-based biochars have performed as well if not better in most applications when they have been tested together.

Once again, these results can vary due to a variety of factors – soil quality, type of crop, weather conditions, and the quality of biochar.
One of the immediately recognized uses for biochar as a soil amendment is in environmentally sensitive areas where nutrient run is problematic.

The Chesapeake Bay, Gulf of Mexico, and the Great Lakes all have dead zones created by excessive nutrient run off, and the use of biochar to bind up those nutrients in the soil in the watersheds that flow into those bodies of water could potentially be a huge market.

All of the soil amendment markets become much greater when organic certification is completed.
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FEED SUPPLEMENT

- Mineral ash from fuels such as poultry manure have been proven to be an effective feed supplement.
- In Europe research has expanded to include biochar made from both poultry and cow manure.
- Research has shown positive results and some countries in the EU have approved biochar from wood as a feed supplement.
- The market in the US will be slower to develop due to the need for FDA approvals.
The composition of manure based biochars contains several valuable nutrients for animals – calcium, phosphorus, potassium, magnesium, and manganese.

Rock Phosphate is becoming more and more expensive and the value of replacing this material will define much of the pricing.
We have supplied biochar to a USDA lab for water filtration studies and they have achieved over 90% removal of copper ions from a water supply.

Again, manure-based biochars have often provided better results than wood-based biochars.
On the lower value end of the biochar scale is the use of biochar for odor control.
Most people are familiar with wood-based biochars. Regardless of the technology producing it, there will be some similarities:

- High carbon content – should be in excess of 60%
- Low mineral ash, with little to no nutrient value itself.
Manure-based biochars will be very different.

Depending on the animal and its diet, the age of the manure, whether it is manure or litter, and the conditions inside of the gasifier/pyrolysis unit, the quality of the biochar will vary.
• Carbon content will be close to 20%.
• Nutrient value will be significant. Individual components will vary:
  – Egg layers will have more calcium
  – Cow manure will have higher magnesium.
  – Poultry will typically have higher overall nutrient content.
  – Many of these nutrients are transformed; the Phosphorus may now be insoluble rather than soluble and as a result not as subject to run off when applied.
All of the previous slides listed the various uses and the benefits they provide.

However, the greatest benefit from manure-based biochar is completely different.

Its greatest benefit is providing an economic alternative to CAFOs for their manure management.
Biochar has the ability to greatly reduce the volume of greenhouse gases being released into the atmosphere.

It also has improve the ability of countries throughout the world to feed themselves.

It also can help reverse the damage done to waterways due to nutrient discharges from agricultural and other sources.
But, in order to have a significant impact in any or all of those 3 areas, there must be large, manure-based systems developed.

And the host facility for any large scale project must be a CAFO.

The majority of CAFOs currently land apply large volumes of raw manure.
Land application near the farm is done for one reason – economics.
The value of biochar provides a viable alternative to this land application.
The greatest barrier to solving the problem of nutrient saturation of soils is the economics – biochar changes those economics.
The economics for manure projects are typically based on multiple revenue streams. There are very few projects where the energy value of the project alone makes it viable. Biochar completely changes the economics as it provides a significant revenue to supplement the other revenues from a project. For example, a 3 MW power project from poultry manure at $0.09 per kw will generate $2,025,000 in annual revenues. Biochar from that same project at $300 per ton would generate $2,700,000.
The production and use of biochar has great potential to help reverse many of the environmental issues mankind has created – land, water, and air.

All projects producing biochar assist in this process.

But to truly make a huge impact, large volumes need to be produced, and large volumes of otherwise environmental liabilities need to be removed – manure-based biochar production facilities accomplish these goals.