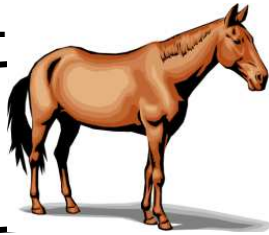


Notes from....



# Serrano Creek Ranch Equestrian Center

MARCH 2008

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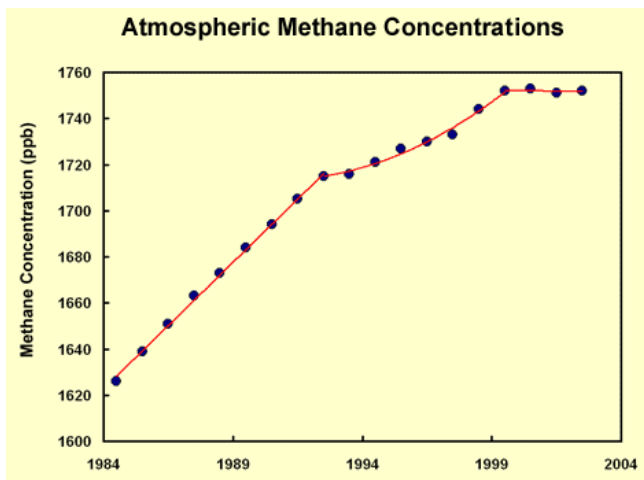
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This month's newsletter is dedicated to detailing what the stable is doing to lessen our impact on mother earth. Specifically our efforts to reduce methane gas which is our greatest potential pollutant.

Methane is formed and released to the atmosphere by biological processes occurring in anaerobic environments (see inset box "Bacteria Types".) Once in the atmosphere, methane absorbs terrestrial infrared radiation that would otherwise escape to space. This contributes to the warming of the atmosphere, which is why methane is a greenhouse gas. Methane is 21 times more powerful at warming the atmosphere than carbon dioxide (CO<sub>2</sub>). Methane's relatively short atmospheric lifetime (approximately 12 years), coupled with its potency as a greenhouse gas, makes it a candidate for mitigating global warming over the near-term. The media seems to spend its energies in symbols of green house gases, most commonly cars and trucks in traffic jams, but science is pointing its finger at methane.

Chart #1 below shows that there has been an increasing level of atmospheric methane in just the last 20 years. How damaging

CHART #1



## Bacteria Types

There are two kinds of bacteria that are relevant to our discussion here. The first are those that require oxygen as part of their "nutrients" to do their work of decomposing (in our case manure and wood shavings). As long as these bacteria receive enough food (plant material), water, and oxygen they will continue to grow and do their work. Their by-product is carbon dioxide (carbon and oxygen), and water (hydrogen and water). If these piles become starved of oxygen, then the aerobic bacteria dies and is replaced with anaerobic bacteria (which survive in environments lacking oxygen.) These bacteria also decompose, but without available oxygen, their by-product is methane which is made up of carbon and hydrogen.

is methane compared to carbon dioxide? If you loaded up a truck of wet manure, and drove that truck to the most southern tip of South America and back, the methane from the anaerobic truckload of manure would produce more greenhouse gases along the way than all the fuel that was burnt

So what are the sources of methane that come from human activities? Chart #2 details these. 25% of all methane comes from landfills which are slow, anaerobic decomposing systems. Natural gas is from methane losses occur during the production, processing, storage, transmission, and distribution of natural gas and (crude) oil.

Enteric fermentation is a fancy term for the animal digestion tract. Principally the more complex the animal digestive tract (especially ruminants) the greater the amount of anaerobic digestion takes place. Cows are on the high end of methane production, and horses, with their simple system, are on the low end. While adjustments in feed types can have minor effects in methane production, the principle factor is the design of the digestive tract.

Manure management is where the stable can

CHART #2

<b>Methane Production</b>	<b>556.7</b>
Landfills	140.9
Natural Gas Systems	118.8
Enteric Fermentation	112.6
Coal Mining	56.3
Manure Management	39.4
Wastewater Treatment	36.9
Petroleum Systems	25.7
Rice Cultivation	7.6
Stationary Combustion	6.4
Abandoned Underground Coal Mines	5.6
Mobile Combustion	2.9
Petrochemical Production	1.6
Iron and Steel Production	1.0
Field Burning of Agricultural Waste	0.9
Year: 2006	

achieve the greatest reduction of the methane that is produced, and in fact manure storage / processing is an activity that can potentially produce far more methane than what goes on in the guts of the horses we stable. Among composters of animal manures, methane is a huge issue.

Conventional composting methods involve building long rows of manures, green waste, spoiled food, etc., into what is known as a windrow. Each week or so the windrows are rotated to allow fresh air to enter. The problem with this system is that the aerobic bacteria quickly consume the oxygen that was provided with the rotation (typically in one hour) and die off. Anaerobic bacteria now are the bosses in the decomposing process and methane is released. Historically, the stable was part of this methane producing practice. The manure would be pushed into a large pile in our manure bin and would quickly become anaerobic. Then once per week it would be hauled off into a composter that used the windrow system. Added to all this methane generation, the manure could be trucked from a composter, to a blending / bagging operation, and trucked to either a store or delivered in bulk to a landscape job. This often entailed hundreds of truck miles.

To reduce our methane, we have embarked on a significant program to keep our manure well oxygenated. Hence all the fans you see. While there is a carbon foot print from running the fans, the methane production is practically nil. Added to this is the savings of all the diesel that would have been spent hauling and turning the compost. The net effect is a substantial reduction.

Carbon sequestration refers to collecting carbon from the air, and putting it / storing it in the earth. Returning carbon in the form of compost is an excellent sequestration option – if it is handled correctly (aerated). It has been estimated that after all the carbon emissions from processing manure to compost are accounted for, there is a net sequestration of 400 pounds for every ton of compost applied to land. With improper composting (anaerobic) the sequestration is minimal at best.

The stable's new composting system provides for maximum aeration, thus keeping it from becoming anaerobic and producing methane. For the 16-20 days that it remains here, prodigious amount of oxygen are blown into the pile, ensuring that the aerobic bacteria have all the oxygen they need to grow and do their work. By the end of this time, the majority of the decomposing is completed, and the potential for anaerobic bacteria growth is minimal. If you look at the process, you'll see fresh manure and shavings collected on the right, then a series of piles that darken as you scan left. This color change represents the amount of decomposing that is taken place.

In February we will have completed the final section of the composting operation. Here we will provide an additional four days of aeration and screening the material to remove any uncomposted hay, thereby creating a uniform product. Also these four days will provide more time for the material to dry, thus being able to transport more material with the same amount of fuel.

Following the old adage "think global, act local", we have created a positive solution to a historical problem. As diesel prices continue increase, and composters are forced to adopted new and expensive technologies to capture methane, traditional disposal of the stable's manure would have become a huge expense, if even available. With our new systems, we have implemented those new technologies. Our goal is to compost and deliver to homes and businesses, all within a few



Work is completed in January of another section of the composting area. Pipes laid in the concrete provide plenty of oxygen to keep the pile from smelling. Additionally the temperature kills off flies and their eggs (known affectionately as huevos rancheros.)

mile radius of the stable. The next phase will require real efforts to market to our neighbors the value of the organic material we are creating.

Over the last year, we have thrown ourselves into understanding and developing a true solution to our manure generation. In this journey we've spent untold hours on the internet reading arcane articles on composting systems, joining and attending commercial composting associations so that we learn some of the secrets, designing a system that followed the laws of physics and microorganisms, creating a full documented application that was approved by six separate governmental regulating agencies, and finally spending over \$50,000 in hard costs to build our system. The result of all this toil, is SCR is now a certified composting facility!

In March and April we will be building our screening and bagging machines, so that we will be putting on the market a truly organic amendment that does wonders for building healthy soils. Additionally, instead of being a contributor to global warming, in a small way we're part of the solution.

With minimal word of mouth we now are selling about 15% of our compost. Now that we have completed the composting aspect of the facility, we'll begin a true effort to properly market what we produce. With the addition of the work that was completed in January and February, we are now producing compost that is free of the ammonia odor that was typical of our trial product. It now has a sweet, earthy smell. To recover our capital and handling costs we'll be selling a cubic yard for \$8 and bagged compost for \$2 for the near term.

Boards of SCR will receive a 50% discount for 2008 as a thank you for putting up with the concrete trucks and other construction annoyances.

What lies in the future? We looking at adding earthworms to our bagged compost to help the garden soils become more aerated and thus assist plants in becoming healthier and bigger. Currently we are raising from a few pounds worms that over time will self select to be able to thrive on the compost we produce. More on this as it becomes more of a reality.

## **Grand Opening**

On March 1st the city of Lake Forest will be having a grand opening for the newly remodeled park that is adjacent to the back gate. If you take any time you'll notice a quasi-western / equestrian theme that runs through it. They've done a wonderful job of design that is infinitely better than the old tree fort with its chain link bridge. If you're here between 11-1 you can stop buy and get a free hot dog and pay your honors to the designers. If you're just riding by, expect a larger than normal crowd that will be running around.