

## Featured Topic: What is the Impact of Manure Salts in your Operation?

Salts are among the chemical constituents of manure and include sodium, calcium, magnesium, potassium, ammonium, chloride, and sulfate salts, along with other cations and anions. The level of salts in manure varies depending on factors such as the type of feed the animals are fed as well as dietary mineral salt supplements. Most people don't realize, that based on diets, manure can contain 25 to over 100 pounds of salts per 1,000 gallons of manure. One dairy in the Midwest was applying 800 pounds of salt per acre annually. In this case, over a three year period, their soil became more compacted and their silage yield declined due to high manure salt application.

### What is a Salt?

The most common salt is table salt (NaCl). What makes it "salty" is when the sodium (Na) and the chloride (Cl) break apart or dissolve into the cation (Na+) and the anion (Cl-), which happens quite easily when placed in water. These, and other ions of salts, can carry an electrical current through a solution. Salt ions vary in their characteristics and solubility.

### How is Salt Measured in Manure?

Salts are measured and expressed in one of two ways: 1) as pounds of salt per 1,000 gallons of manure, or 2) as electrical conductivity (EC). Salts expressed as pounds per 1,000 gallons include ions such as NH<sub>4</sub><sup>+</sup>, K<sup>+</sup>, Ca<sup>+</sup> Mg<sup>+</sup> and Na<sup>+</sup>. An EC meter measures how much electricity moves through a solution—the saltier the solution, the more electricity moves through it and the higher the EC reading. The following table (Table 1) shows the variation in pounds of salt and the EC from manure pits in a southern Iowa swine operation. The pounds of salt per 1,000 gallons varies from 30 pounds to over 100 pounds, and the EC readings correlate to the pounds of salt. The higher the salts content the higher the EC reading. Raw manure will typically be 33+ EC, but completely bioaugmented manure will be less than 7 EC.

**Table 1: Manure Analysis Studies on One Swine Operation in Iowa**

Manure Pit Sample ID.	Type of Manure	EC (µs/cm)	Pounds salt/1,000 gallons	Manure Type
1	Raw	19.3	63.6	Finisher
2	Raw	32+	119.5	Finisher
3	Raw	14.4	48.8	Finisher
4	Raw	33+	108.9	Finisher
5	Partially Bioaugmented	12.2	38.6	Finisher
6	Partially Bioaugmented	10.8	22.1	G. Finisher
7	Partially Bioaugmented	10.5	24.4	G. Finisher
8	Raw	17.3	90.8	Finisher
9	Raw	13.5	28.4	Finisher
10	Raw	25	84.4	Finisher

Sample date is March 2007. Pits 5, 6 and 7 had manure bioaugmentation technology added in November and was sampled in March the next year.

### Impact of Salt in Livestock Operations

Salts from manure not only cause corrosion of facilities and equipment, but high salt manure applied to soil will also result in the following:

- Reduced plant growth and vigor by altering uptake of nutrients and water. In high salt soils it takes more energy for the plant to uptake water.
- Salt causes soil structure to collapse and become compacted, thus, drainage and air movement in soil is negatively impacted.
- Salts destroys biological activity, which incurs nitrogen fixation, nutrient solubility and available.

With a continuous application of high salt manure and/or fertilizer, the soil ecosystem collapses and crop yields decline.

# MANURE MANAGEMENT NEWS

## Doug Rohlik, Seaforth, MN

“After five years of applying 5,000 gallons of raw swine finisher manure our soybean yields went from 60 bushels/acre to 30 bushels per acre. After three years of bioaugmenting our finisher manure and reducing our rates to 3,000 gallons per acre, the soybean yields are back in the 50 bushel per acre range. Bioaugmenting manure in our operation resulted in numerous benefits such as less agitation required, more uniformity in field application, less weed pressure and improved yields with fewer gallons per acre. The bioaugmented manure has allowed us to cover more acres with the same amount of manure and improve corn yields at the same time. We’re also noticed that our crops stay greener longer and don’t prematurely die.”



Bioaugmented manure crops stay greener longer.



Bioaugmented manure helps reduce premature crop death.



Reduced manure salts improve soybean yield.

## How can Salt Levels be Reduced in Manure?

The process of manure bioaugmentation reduces salt levels through the digestive process. An active population of beneficial microbes combines the salt ions in the manure with various organic and inorganic compounds. The salt ions, then, no longer exist as salts and the pounds per 1,000 gallons and the EC are reduced. Note in Table 1 with samples 5, 6 and 7, bioaugmenting the manure from November to March dropped both the pounds of salt per 1,000 gallons and the EC reading.

Total manure salts should not exceed 500 pounds per acre and should even be less than 500 pounds per acre if rainfall is less than 25 inches and/or the soil CEC is less than 12 meq/100g. The salt contributions from commercial fertilizer applications should also be considered.

**Table 2: Salt Analysis of Bioaugmented Swine Finisher Manure Compared to Raw Manure**

Two 275 gallon totes were filled with 200 gallons of raw finisher manure. One tote was bioaugmented and the other left as a control tote.

**Starting date:** October 25, 2010

**Finishing date:** November 8, 2011

**Number of days:** 378 days

The totes were thoroughly mixed and sampled. The following is the results:

	Pounds Salt/1,000 gallons	EC Reading (µa/cm)
Control Tote	90.6	29.8
Bioaugmented Tote	69.1	15.6

Generally speaking, for the same length of time, we see more salt reduction, especially in an uncovered lagoon environment, than we do in a tote.

## Up Coming Events

**ProfitPro 2012 Winter Conference, Albert Lea, MN**  
**Pre-Conference (Managing Manure to Optimize its Value)**  
 Thurs. A.M., February 9, 2012 (9:00 am to noon with lunch)  
**Conference** - Thurs. P.M. & Fri., February 9 & 10, 2012

**2012 MN Custom Applicators Meeting, Hutchinson, MN**  
 February 15, 2012; 5:00 to 7:00 pm, Victorian Inn (Best Western)

**FREE Manure Management Teleconference**  
 scheduled for **February 2, 2012** from 8 to 9 pm CST on  
**What is the Impact of Manure Salts**  
**in Your Operation**

For more information, go to [manuremaster.com](http://manuremaster.com).  
 Dial the toll free number 1-866-225-3498 just before 8 p.m. (CST)  
 and enter the security code 7159 # (pound key).

## *Agronomic ROI for Manure Bioaugmentation*

Application of bioaugmented manure results in improved soil health, plant health and agronomic performance. Research results and customers reports show a 5 to 15 percent increase in yield from applying bioaugmented manure versus raw manure. There are many benefits of bioaugmented manure, but the agronomic benefits alone more than justify the cost.

The following scenario show cases the economic benefit of bioaugmented manure.

Step	Crop: Corn		
1	Average yield	=	200 bu/acre
2	3% yield advantage of bioaugmented manure	=	6 bu/acre
3	Value per bushel	X	\$6.00
4	Income advantage per acre (yield advantage x value/bushels)	=	\$36.00
5	Acres treated with bioaugmented manure [amount of bioaugmented manure (700,000 gallons) ÷ gallons/acre (3,000 gallons)]	X	233
6	Increased revenue from bioaugmented manure (acres applied x income advantage/acre)	=	\$8,388.00
7	Cost of treatment of manure applied (7000,000 gallons x \$0.002/gallons)	-	\$1,400.00
8	Income advantage (increase revenue – treatment cost)	+	\$6,988.00
9	Return on Investment (ROI) (increased revenue ÷ cost of treatment)		5 times

In this scenario, for every dollar spent, there was five times returned just on the agronomic benefits.

Go to [manuremaster.com](http://manuremaster.com) to calculate your own ROI from bioaugmenting your manure.  
Click on “**Estimate the Potential Agronomic Benefit of Bioaugmenting Your Manure**”

## *Bioaugmented manure advantages are:*

### *Facility*

- Less odor/gases
- Less flies
- Better working conditions
- Healthier animals
- Regain storage capacity
- Better equipment & facility longevity
- Reduced utility cost
- Reduction of foam
- Reduction of risk

### *Application*

- Less agitation required
- Less foaming and full tank capacity
- Faster unloading
- More uniform application
- Less odor during handling & application
- Less chance of gassing animals
- Reduced risk exposure
- Better working environment
- Less pathogen risk between sites
- Easier cleaning & less corrosion of equipment

- Many producers are reducing their rate of bioaugmented manure (pre-digested manure) applied per acre and maintaining or increasing yields. If you can increase the amount of acres covered with the same amount of manure, what is that worth?
- The inclusion of a biocatalyst, such as Catawater AG, with your manure application can further improve soil health, crop health and yield. Research shows that Catawater AG added during the manure application can improve yield an additional 5 to 10 percent.

# MANURE MANAGEMENT NEWS

## *How can I Reduce Salt Levels and Receive More Value from my Manure?*

ProfitPro promotes the Full-Circle Animal, Manure and Soil-Plant System™. The Full-Circle System can start with the animal or manure or soil-plant depending on your farming operation. The key is to improve health, reduce production cost and improve enterprise sustainability. The Full-Circle foundation is based on achieving balance through a probiotic approach at each phase of your farming operation.

In the Full-Circle System, salt levels in manure and soil will be reduced by the following technologies used alone or in combination:

- Probiotic feed additives
  - ◆ Swine:
    - ✓ Healthy Hog
    - ✓ MaxiPlex
  - ◆ Dairy and Beef:
    - ✓ Bovine Direct-Fed Microbials
- Prebiotic water treatments
  - ◆ WaterRite
- Manure bioaugmentation technology
  - ◆ Manure Management Service
  - ◆ Self-treatment products:
    - ✓ Manure Master Dry Concentrate
    - ✓ Manure Master FoamAway
    - ✓ Microbe-Lift/Hog
    - ✓ Microbe-Lift/Dairy
    - ✓ Microbe-Lift/Sludge Away
- Additives applied with the manure at application time or to the soil
  - ◆ Catawater AG



**ProfitPro offers a Manure Management Service to help livestock producers tackle the most difficult manure management issues including the reduction of manure salt levels.**

**Go to [manuremaster.com](http://manuremaster.com) or call 1-888-875-2425 for more information.**