A study of the effects of litter treatments on commercial broilers.

Performed by Highlander Research & Consulting L.L.C.

Background

Previous study of Litter Life treatment demonstrated that by introducing natural non-pathogenic bacteria in conjunction with a rich carbon source to the litter bed will cause a rapid natural release of ammonia prior to placement of the animals and reduce the occurrence of harmful pathogens, thus resulting in a healthier environment for the animals to thrive.

Study Design

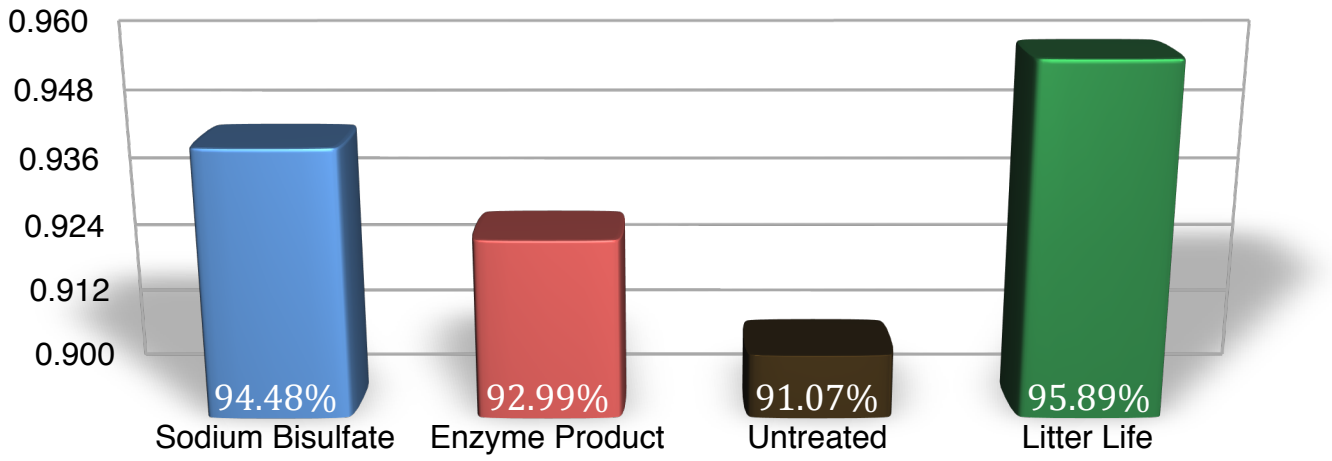
The study is designed to compare the effectiveness of Litter Life against current litter treatments. The study performed at a commercial poultry facility under Pilgrim's Pride: 12 barns were compared, three were treated with Sodium Bisulfate (PLT), three with an Enzyme product (ESS), four were treated with Litter Life, and two were untreated as controls. 15,000 High Y and Ross cross chicks were place in each barn. The barns were maintained in similar manners of temperature and general environmental conditions, feed and vaccinations were consistent between the barns.

Results of Study

Livability

Percentage Livability in the Sodium Bisulfate barns was 94.48%, Enzyme product was 92.99%, Litter Life was 95.89%, and the untreated control was 91.07%. The results of the 12 houses compared, yielded a greater livability in the Litter Life treated barns over all other compared treatments.

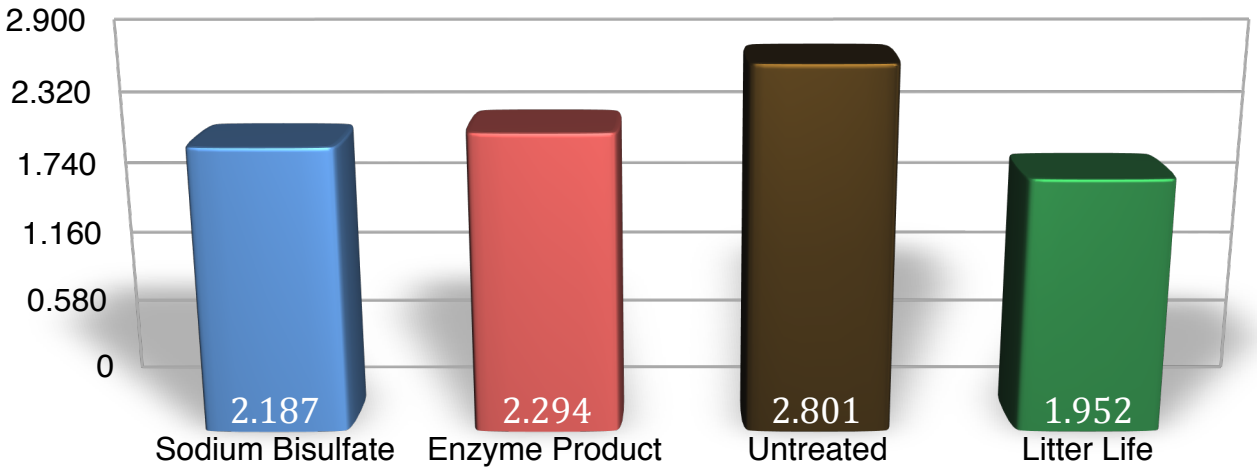
- ★ Litter Life yielded a 1.47% greater livability compared to Sodium Bisulfate.
- ★ Litter Life yielded a 3.02% greater livability compared to the Enzyme product.
- ★ Litter Life yielded a 5.02% greater livability compared to untreated control.



Feed Conversion

Feed conversion in the 12 barns of the study, in the Sodium Bisulfate barns was 2.18, Enzyme product was 2.29, Litter Life was 1.95, and the untreated control was 2.80. The results of the 12 houses compared, yielded a greater feed conversion in the Litter Life treated barns over the control and competitors barns.

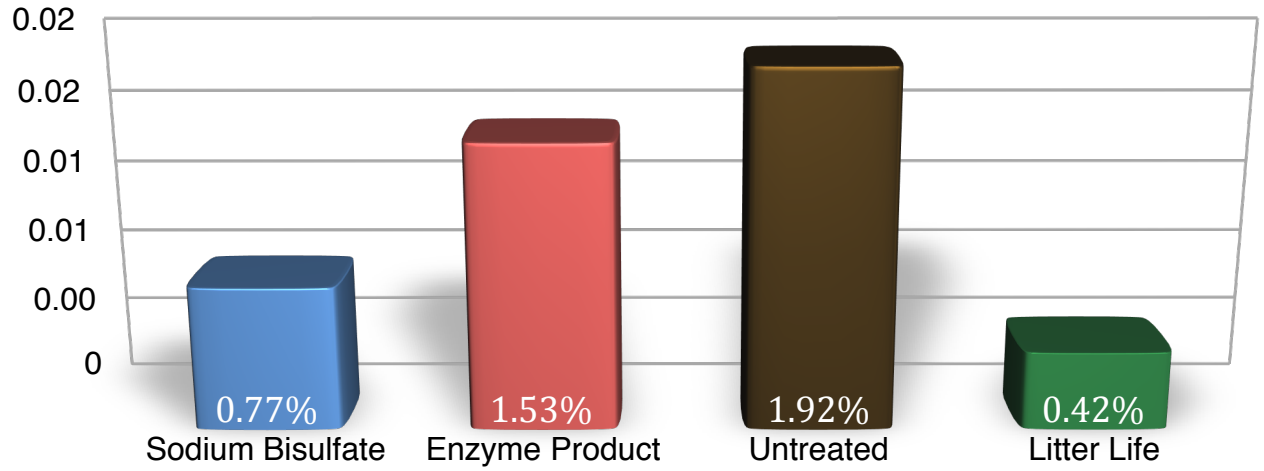
- ★ Litter Life yielded 11.79% improvement in feed conversion compared to Sodium Bisulfate.
- ★ Litter Life yielded 17.43 improvement in feed conversion compared to the Enzyme product.
- ★ Litter Life yielded 43.58% improvement in feed conversion compared to untreated control.



Condemned by Weight

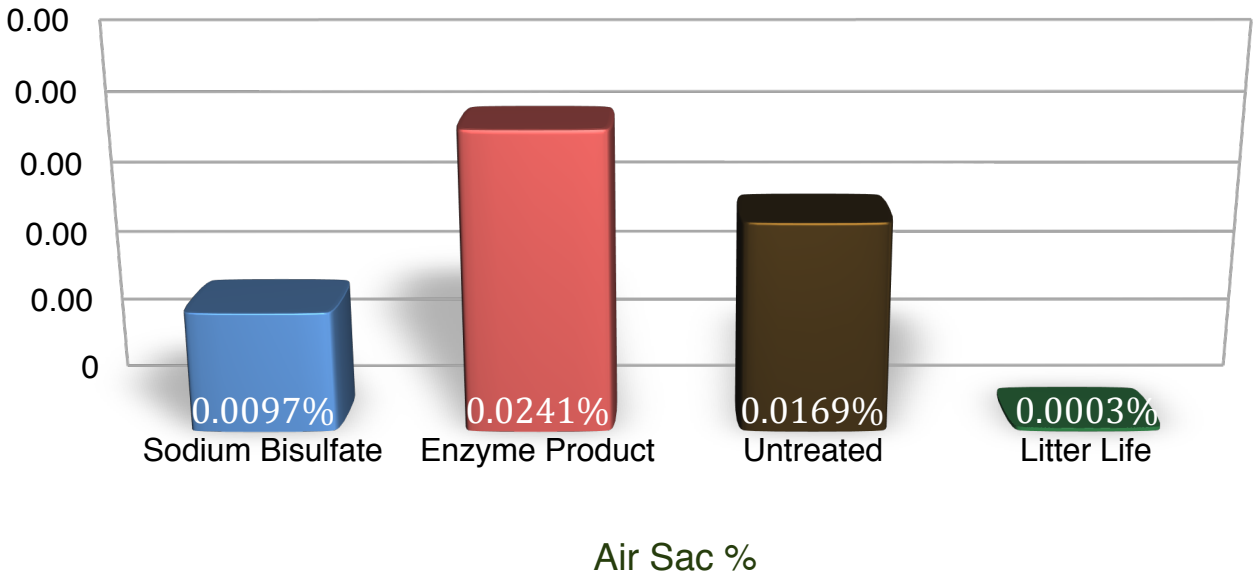
Total condemned pound of harvested product is the amount condemned due to a condition rendering either a portion of or the entire carcass unfit for human consumption. In the 12 barns of this study, in the Sodium Bisulfate barns condemnation was 0.77%, Enzyme product was 1.53%, Litter Life was 0.42%, and the untreated control was 1.92%. The results of the 12 houses compared, provided a greater processed pounds in the Litter Life treated barns over the control and competitors barns.

- ★ Litter Life yielded .35 less total condemnation compared to Sodium Bisulfate.
- ★ Litter Life yielded 1.11 less total condemnation compared to the Enzyme product.
- ★ Litter Life yielded a 1.5 less total condemnation compared to untreated control.



Air Sac Condemnation

There was a significant decrease in the Air Sac condemnation; there was also a significant decrease in the occurrence rate of salvageable air sac lesions. Litter Life yielded a 95% reduction in airsaculittisis condemnation and reprocessing over the other products compared in this study.



Hypothesis: The reduction in airsaculitis is believed to be based upon regeneration of the litter bed, the core principle behind the action of Litter Life. Studies performed confirm that birds exposed to high ammonia levels are at greater risk of e-coli infections resulting in airsaculittis.

http://www.wam.umd.edu/~iestevez/extension/ppv4n1.pdf

The hypothesis stated are to be followed with studies confirming the reduction in ammonia exposure to flocks, and the competitive inhibition of pathenogenic organisms on poultry litter.

Conclusions

The results of this study indicate the use of Litter Life significantly increased the livability and decreased the feed conversion rates of the flocks compared, while decreasing total condemned % and Airsaculittis incidence rates. Based on the data in this study, poultry producers could anticipate improved farm productivity and plant cost reductions in condemnation and labor hours due to reprocessing. While removing the possible chemical contaminates to the farm traditional treatments currently use, Litter Life provides a nontoxic environmentally compatible alternative.

Southland Organics

Litter Life

LITTER Life

Litter Life is a 100% organic designed to meet today's ever increasing demands to be environmentally friendly. Litter Life not only gives you a 100% organic product but can save you money in many ways:

- ★ Litter Life is a liquid pH neutral product comprised of a natural organic material and selected biology.
- ★ Litter Life contains no heavy metals of inorganic acids.
- ★ Litter Life is nontoxic, non-hazardous, all natural.
- ★ Litter Life is easy to apply, average of 10 gallons in 10 minutes for 20,000 square feet. Does not require any protective gear during application.
- ★ Litter Life carries the US EPA "Design for the Environment" seal.
- ★ Litter Life is 100% organic, certified salmonella free and a product of the USA

Litter Life works in the following ways:

- ★ Rapidly releases solid ammonia from the existing litter.
- ★ Controls ammonia levels throughout the growth period.
- ★ Populates litter with beneficial bacteria which reduces stress on the birds.
- ★ Reduces pathogenic bacteria by competitive exclusion.

Litter Life vs. Normal Growing Process

This study was done to compare the results of Litter Life against standard chicken house practices on the end profitability of commercially raised broilers while the chickens were in place. 64 houses with an average of 20,000 birds each were tested with the Litter Life product with the following results:

- ★ Reduced mortality rate by 3.1%. This is a gain of 620 birds per house or just less 40 thousand more live birds for the 64 houses.
- ★ Increased flock weight by 3.9%. Based on an average weight of 5 pounds per bird this would be a gain of .2 pound per bird. This would mean a gain of 3,800 pounds per house figuring a 5% mortality rate.
- ★ Reduced condemnation by 38.6%. This means a gain of over 500 pounds of sale-able bird per house or a 32,000 additional pound from the 64 houses tested.
- ★ Improved feed conversion of 6.2%. This means approximately 5 tons less feed per house or a total of 320 tons feed for the 64 houses. A major savings in feed plus handling.

Litter Life vs. Poultry Guard

A Seven Farm Control Group

This test was done using four houses each for Litter Life and Poultry Guard plus additional information from seven other farms using their standard program.

Mortality Rate:

- ★ Mortality rate in Litter Life houses was 1.359%.
- ★ Mortality rate in Poultry Guard houses was 1.374%.
- ★ Mortality rate in seven farm average was 5.16%.
- ★ Litter Life showed a 1 % gain over Poultry Guard and a 73% gain over what was used in the seven farm average.

Condemnation Rate:

- ★ Condemnation rate in Litter Life houses was 0.35%.
- ★ Condemnation rate in Poultry Guard houses was 0.45%.
- ★ Condemnation rate in seven farm average was 0.44%.
- ★ Litter Life showed a 22 % gain over Poultry Guard and a 20% gain over what was used in the seven farm average.

Food Requirements (Pounds of food per pound of broiler weight:

- ★ Litter Life required 1.717 pounds of food per pound of broiler weight.
- ★ Poultry Guard required 1.723 pounds of food per pound of broiler weight.
- ★ The seven farm average required 1.84 pounds of food per pound of boiler weight
- ★ Litter Life reduced the amount of food by 0.35% over Poultry Guard and by 6.68% compared to the seven farm average. On a 20,000 bird house this equates to a gain of 540 pound of weight more than Poultry Guard and 10,306 vs. the seven farm average.

Reduction of Ammonia:

- ★ Litter Life produces a reduction of ammonia 15% better than the Poultry Guard in the tested houses.

Reduction of Cake:

- ★ There was 33% less cake removed from the Litter Life houses than from the Poultry Guard Houses.

Summary

Why Litter Life Works:

- ★ Rapidly releases solid ammonia for the litter.
- ★ Controls ammonia levels throughout the 'grow out' cycle.
- ★ Populates the litter with beneficial bacteria which helps reduce stress on the birds.
- ★ Reduces pathogenic bacteria by the process of competitive exclusion.

Ease of Application:

- ★ Convenient liquid form. Comes in gallon containers, 55 gallons drum and 250 gallon totes.
- ★ Applied with conventional liquid spray equipment.
- ★ With the right equipment a typical 20,000 bird house can be treated in 10 minutes or less.
- ★ Litter Life is non-toxic, non-hazardous thus it does not require any special application garments for the person doing the application.

Not only is Litter Life an environmentally friendly product but is out performs many other products used for this purpose in many ways.

APPLICATION:

Step 1: Seal the house immediately after the flock is removed to maintain higher temperature. Microorganisms are more effective in warmer temperatures. Ventilate prior to reentry for service, or if moisture begins to condensate in the house.

Step 2: Immediately after de-caking, and BEFORE new bedding is added, apply Litter Life. The application rate is 64 ounces per 1,000 square feet or 1 gallon per 2000 square feet. Litter Life should be diluted at a ratio of 1:9. For each gallon of concentrate used, dilute in 9 gallons of water. After diluting, wait at least 30 minutes before applying. Any liquid sprayer system can be used for application. A spray applicator with a 20' boom span can complete treatment in less than 10 minutes in most cases. Uniformly cover the entire surface of the litter bed.

Litter Life is flexible and safe. It can be applied to live birds.

US Patent No.: 6,656,723 B1

Southland Organics

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Southland Organics

Developed in partnership with the U.S. EPA "Design for the Environment"

LITTER Life

Southland Organics' Litter Life product is a a very unique solution to poultry litter management that is unparalleled by any other marketable product in its ability to bind harmful compounds and eliminate odors. The power of our Litter Life is patented and protected under US and International Law.

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Composition

95% - Histosol

2.5% - Class A, non-pathogenic, bacillus spores

2.5% - blended microbial package

Histosol

An ancient formation of extremely rich organic peat humus. Contains 95% pure organics and nearly 40% fixed carbon from both marine and vegetative sources.

Rich in humic acid (11%)

•Larger and more complex polymers in humic substances are humic acids.

•Increases adsorption of minerals.

•Increases adsorption of organic compounds.

•Increases water holding capacity of soil.

•Increases soils buffering capacity of PH.

•Chelates Magnesium, Calcium and Iron.

Rich in fulvic acid (4%)

•Involved in the chemical reactions that influence plant growth.

•Chelates Micro Nutrients.

•Effective oxidizing agent.

•Petroleum Products, Organic Toxins and Heavy Metals are subject to oxidation.

•Once oxidized our specially adapted blend of microorganisms begin to bio-degrade the toxins.

Rich in highly complex lignin molecules

•Slowly decomposing component that contributes to Humus accumulation.

•Plays a significant role in the carbon cycle.

•Nutrient source for soil fungi.

•Plays an important role in the formation of soils.

•Scavenges hydrogen sulfide.

•Binds ammonia

Indigenous Microorganisms

Bacillus mojavensis - AMH 100
Bacillus subtilis - AMH 102
Nitrobacillus georgiensis – AMH 103 (Brevibacillus brevis)
Bacillus sp. – AMH 104 (Stearothermophilus)
Paenibacillus polymyxa – AMH 105
Bacillus megaterium – AMH 106
Bacillus amyloliquefaciens – AMH 107
Bacillus mojavensis – AMH 108 (Bacillus subtilis)
Bacillus pumilus – AMH 109 (Bacillus licheniformis)
Bacillus pumilus – AMH 111
Bacillus pumilus – AMH 114
Bacillus pumilus – AMH 115
Bacillus mojavensis – AMH 118 (Bacillus subtilis)
Bacillus pumilus – AMH 119 (Brevibacillus laterosporus)

Bacillus Spores

Bacillus licheniformis

- Breaks down bird feathers

Bacillus megaterium

- Powerful soil inoculant
- Breaks down phosphates
- Prevents leaching
- Extracts Hydrocarbons
- Viral Antigen

Bacillus polymyxa

- Powerful soil inoculant
- Nitrogen fixing

Bacillus circulans

Microbial Blend

Purple Bacteria

- Have aerobic, anaerobic and facultative properties
- Remove environmental toxins
- Starts the production of photosynthesis
- Nitrogen fixing bacterium

Purple Sulfur Bacteria

- Reduces elemental sulfur
- Reduces H2S
- Bioremediates ground water nitrate contamination.

Pseudomonas

- Colonizes to form protective barrier against Fusarium and Pythium
- Prevents wound and respiratory infections associated with bacterium such as MRSA

Alcaligenes

- Inhibits growth of certain algaes
- Effective at the reduction of nitrate into the safe, ionized ammonium

Flavobacterium

- Aerobic, anaerobic and facultative abilities
- Metabolizes hydrocarbons

Nitrosomonas

- Oxidizes ammonia into nitrite
- Increase nitrogen levels while limiting CO2 fixation
- Consume large amounts of ammonia for energy and cell division

Nitrobacter

- First convert ammonia into nitrites
- Convert the nitrites into nitrates, which are readily absorbed by plants.

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LITTER Life

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Litter Life contains highly active “reactive lignins” with 7 to 9 carbon and oxygen open bonding sites per molecule. The complexed lignin reactive surface structure is estimated at 900,000 square meters per kilogram and an enormous negative cation exchange capacity of 1500 to 3000 moles per kilogram. These active sites function as a macromolecular sponge, adsorbing and binding (capturing) potentially odorous and harmful compounds such as Hydrogen Sulfide and Ammonia.

Lignin has also been shown in the laboratory to have an impressive effect in suppressing bacterial growth. In an experimental study, (Nelson et al.) Analyzed the effect of lignin on the growth of bacteria after incubation of 0,2,4,8 and 24 hours in vltro and obtained the following results:

	Hours of Incubation				
	0	2	4	8	24
Lignin					
S. aureus	1.0×10^3	8.0×10^2	0	0	0
E. coli	2.3×10^3	5.0×10^1	0	0	0
Klebsiella	3.4×10^2	3.7×10^2	2.0×10^3	0	0
Pseudomonas	3.6×10^2	3.8×10^2	0	0	0
Without Fiber					
S. aureus	$9.0 \times 10^{\wedge 2}$	4.4×10^3	6.6×10^4	1.7×10^8	1.3×10^9
E. coli	1.7×10^3	2.3×10^4	9.0×10^5	3.3×10^9	3.3×10^9
Klebsiella	1.2×10^3	7.3×10^3	1.6×10^6	1.4×10^8	7.1×10^8
Pseudomonas	8.5×10^2	2.0×10^3	2.9×10^4	9.0×10^8	2.2×10^9

- Non Corrosive
- Keeps Litter DRY!
- Binds Ammonia!
- Reduces “caking” in litter
- Non-toxic
- Simple to apply
- Amazing odor abatement qualities
- Less shavings required
- Reduces mortality rate
- Reduces condemnation rate

SOIL FOODWEB

Design for the Environment U.S. EPA

USDA ORGANIC

GUARANTEED ORGANIC CERTIFIED ORGANIC BY QCA CERTIFICATION AGENCY

MATERIAL SAFETY DATA SHEET
PRODUCT: Litter Life (Microbial Culture) INFORMATION

SECTION I

Manufacturer's Name:	Southland Organics
Address:	PO Box 82366 Athens, GA 30608
Emergency Telephone:	(912) 489-3909
Information Telephone:	(706 478-7508
Date Prepared:	2/1/00

SECTION II INGREDIENTS/IDENTITY INFORMATION

Hazardous Ingredients: None

Components:	Viable bacterial cultures (largely water)(>5%). CAS#7732-18-5. Ingredients not precisely identified are nonhazardous & Proprietary. All chemical ingredients appear on the EPA TSCA Inventory. Values are not product specifications. The above ingredients have been added to a non-hazardous liquid organic media as a carrier and microbial stimulant.
OSHA PEL:	None
ACGIH TLV:	N/A
Other Limits:	None
%(optional)	N/A

SECTION III PHYSICAL/CHEMICAL CHARACTERISTICS

Boling Point:	100 C	Specific Gravity:	1.04 approx.
Vapor Pressure:	Equivalent to water	Melting Point:	N/A
Vapor Density:	Equivalent to water	Evaporation Rate:	N/D
Solubility in Water:	99%	HIMS:	Health-1
Appearance & Odor:	Brown/Black liquid Earthy odor		Fire-0 Reactivity-0
PH:	Range 6.5 to 8.0		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Flash Point:	N/A	Flammable Limits:	N/A
LEL:	N/A	UEL:	N/A
Extinguishing Media:	None		
Special Fire Fighting Procedures:	N/D		
Unusual Fire & Explosion Hazards:	N/A		
Fire & Explosion Hazard Summary:	Not considered to be a fire hazard.		

N/A = Not applicable N/D = Not determined

Litter Life (Microbial Culture)

SECTION V REACTIVITY DATA

Stability: (Unstable/Stable)	Stable under normal conditions.
Conditions to Avoid:	Strong acids or alkali compounds may inactivate bio cultures.
Incompatibility: *(materials to avoid)*	Strong acids or alkali compounds.
Hazardous Decomposition or Byproducts:	N/A
Hazardous Ploymerization: *(May occur.Will not occur)*	Will not occur.
	This is a non-toxic, nonpathogenic mixture of bacteria in a liquid media.

SECTION VI HEALTH HAZARD DATA

Route(s) of Entry:	
Inhalation-	Will not occur.
Skin-	Prolonged contact may cause slight irritation.
Ingestion-	May cause sickness.
Health Hazards: *(Acute & Chronic)*	None Known
Carcinogenicity:	N/A
NTP-	N/A
IARC Monographs-	N/A
OSHA Regulated-	N/A
Signs & Symptoms of Exposure:	Ingestion: No effect if ingested in small amounts. A single dose of this product is rarely toxic by ingestion. Irritation of the mouth, pharynx, esophagus and stomach can develop. Eyes: This material may cause eye irritation. Organisms used are non-pathogenic but can cause infection when in contact with open wounds and are susceptible to many commonly-used antibiotics. Skin: Slight redness on hands and forearms if individual has a history of dermal allergic reactions. Dermatitis and skin sensitization can develop after repeated and/or prolonged contact.
Medical Conditions Generally Aggravated by Exposure:	May cause infection if in contact with open wounds.
Emergency & First Aid Procedures:	Ingestion: Call poison control center. Eyes: Immediately flush with water for 15 minutes. Seek medical attention if irritation persist. Skin: Remove contaminated clothing and footwear. Wash with soap and water.

N/A = Not applicable N/D = Not determined

Litter Life (Microbial Culture)

SECTION VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in case material is released or spilled:	Flush spilled materials into sanitary or storm sewers. Use chemical absorbent and sweep up small spills. Contain and collect large spills.
Waste and Disposal Method:	Dispose of in accordance with federal, state, and local regulations.
Precautions to be taken in Handling and Storing:	Minimize exposure in accordance with good hygiene practice. To maintain shelf life, avoid prolonged exposure to high or low temperatures and humidity. Avoid temperatures above 110 F and keep from freezing.
Other Precautions:	Keep out of reach of children.

SECTION VIII CONTROL MEASURES

Respiratory Protection (Specify Type)	None required for recommended use. Avoid creating aerosols in poorly ventilated areas.
Ventilation: Local Exhaust-	Normal
Mechanical- *general*	N/A
Special-	None
Other-	None
Protective Gloves:	Rubber gloves not necessary but recommended.
Eye Protection:	Safety glasses not necessary but recommended.
Other Protective Clothing or Equipment:	As determined.
Work/Hygienic Practices:	Normal

N/A = Not applicable N/D = Not determined

All information contained in this MSDS is believed to be accurate based on the information available at this time. No warranties, expressed or implied, are made.