

Department of Agriculture, Trade and Consumer Protection
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Grant Project Final Report

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Final Report on R & J Partnership's
"Wisconsin Poultry Waste Solution"

The objective of the 15 month prototype composting project performed by R & J Partnership was to provide a comprehensive manure management solution for the Wisconsin poultry industry. There have been many efforts by producers, government officials and industry participants to answer the question of what to do with manure waste as a part of agricultural operations. The question has intensified in recent years as science has identified agricultural producers as potential polluters to the environment. The poultry industry has received criticism and blame because of the great concentration of birds in a small area. Since poultry manure has a high demand among crop producers, the primary way of dealing with waste has been to land spread apply the waste to agricultural fields. For most of the last several decades, application of manure to land has been regulated by nitrogen rates. Little attention was paid to levels of phosphorous being applied to the soil. Recently, new studies have shown that phosphorous can be damaging as it runs off into rivers and lakes. Elevated levels of phosphorous in rivers and lakes have been shown to cause higher levels of algae and decreased levels of nutrients and oxygen available for fish and plant life.

Since poultry manure is high in nitrogen it is often the fertilizer of choice for farmers. However, poultry manure is also very high in phosphorous, much higher than that of dairy or hog manure. Further, crops such as corn, alfalfa and soybeans are much more efficient at taking nitrogen out of the soil than phosphorous. Therefore, phosphorous has been built up in areas that have utilized poultry manure as a fertilizer over many years. The poultry farm associated with this project, R & J Partnership, recently soil tested 10 fields that have received their poultry manure for many years. According to Wisconsin Department of Natural Resources standards, 50-75 ppm is an acceptable level of phosphorous in the soil. Stunningly, only one of the ten fields had a ppm test of less than 200! Unfortunately for poultry producers, R & J's dilemma is usually the rule rather than the exception. The choices for R & J are similar among to that of other poultry producers: either compost the manure or haul the manure to fields away from the farm. For example, S & R Egg Farms of Whitewater, Wisconsin spends \$250,000 annually to haul their manure 4-10 miles away from their operational site. The fact of the matter is, most large poultry farms find themselves in the same or similar situation.

In the end, R & J Partnership found Orgainsoil, LLC a subsidiary of Mach III, Incorporated of Mason City, Iowa. Orgainsoil was marketing an in-vessel technology produced by Mr. Jim McNelly of Natur-Tech, Inc. Most importantly, Orgainsoil has now completed 36 months of market research and has found numerous buyers for this product.

FIRST FINDING: The initial proposal was to have OrgainSoil purchase the compost/fertilizer for \$90.00. In order to get a five to seven year return on investment that number needed to be increased to \$125/ton. The prototype phase has allowed us to get a better handle on costs of construction, production and supplies.

The vision of this venture was to create a comprehensive business solution for poultry producers in terms of their manure management. That is, R & J Partnership proposed to utilize an in-vessel technology to create a marketable *fertilizer*. In conjunction with a marketer such as Organisoil LLC, R & J Partnership wanted to change the perception of manure as waste to one that creates a highly profitable business model.

The technology we utilized in the pilot project was a six container system that created 30 tons of compost every two weeks. The proposed “forward processing” to create a fertilizer 3% nitrogen had not been tried at a large commercial scale as a means of a comprehensive solution for poultry waste. The results of the prototype period include the following:

RESULTS:

1. Created a compost/*fertilizer* of greater than 2% nitrogen that will compete with commercial synthetic fertilizers
2. Eliminated vector (fly) problems
3. Controlled odor issues
4. Controlled ammonia gas emissions
5. Eliminated leaching as a part of manure storage
6. Created a pathogen-free product

The product was measured by two independent labs.

- Soil Control Labs of Watsonville, California
- Microbial Matrix Systems, Inc. of Tangent, Oregon

MORTALITY ISSUE: Another innovation this technology allowed was the ability to compost mortality or chicken carcasses. On average, R & J Partnership loses about 5% of the pullets grown during each flock. Previously, the mortality was rendered by National By-Products of Des Moines, Iowa at a cost of \$1200.00 per year to R & J Partnership.

SECOND FINDING: The technology worked beautifully to fully compost all mortality on the farm. The mortality was mixed in with the manure/carbon blend and reached temperatures of 70 Celsius, fully composting the manure and mortality. Going forward, R & J Partnership will continue to use the technology for composting all of the on-farm mortality.

In addition, R & J Partnership is looking to partner with the various layer operations in the state of Wisconsin all of which have the issue of “spent” hens. Chickens have a laying lifespan of approximately two years. After two years, these chickens no longer produce eggs at a rate profitable enough to pay for the feed they consume and the labor required to care for them. “Spent” hens are also rendered if there is an available market. However, often times the rendering market is not available. Therefore, these chickens are either composted or put in a landfill. Seven states have already banned the land filling of mortality because the concerns for ground water contamination. The layer operations in Wisconsin have barns with anywhere from 100,000 to 275,000 hens. The practice of composting or land filling so many birds is not sustainable for the industry or the environment. In the future, the in-vessel technology will be used to compost all of the spent hens discarded by Wisconsin’s layer operations.

THIRD FINDING: Potential partners include:

- Daybreak Foods of Lake Mills, WI (1.1million layers)
- Creekwood Farms of Lake Mills, WI (1.2 million layers)
- Peck Farms of Spring Green, WI (500,000 layers)

PROJECT WORK

The prototype testing has taken 15 months in duration. Testing of the end-product and manipulating the process has been ongoing during these months. Organisoil, LLC has purchased the output of the prototype at \$90/ ton. The results of the first phase are the following (see complete test results ATTACHED):

**2-3.2.9% Nitrogen
Moderately Stable
Somewhat Immature
High Nutrient Provider Compost**

The second phase is to enlarge the project to take all of the manure and mortality produced by the pullet farm (~5000 tons annually) and convert it into approximately 6000 tons of marketable compost (the additional 1000 tons comes in the form of a carbon source added at the beginning of the composting process.) Further, this expansion would demonstrate how the facility could be replicated at other large poultry farms in the near future. There are numerous large poultry farms already interested in our work with the idea that we could eventually run a full scale composting facility at a number of sites besides our own .

RESULT: R & J Partnership would like to build a full-scale facility at its own pullet farm in Kewaskum, Wisconsin beginning September 1, 2006 in order to compost all of its manure and mortality. The expanded facility would incorporate the same composting processes identified during the prototype phase. The expanded facility will utilize the following equipment:

Cat Loader	\$46,000.00	The operation will have the following annual costs:	
Truck-mounted mixer	\$90,000.00	Salary/Wages/Benefits	\$235,000.00
Tractor	\$46,300.00	Utilities	\$4,000.00
Roll-off truck	\$27,400	Fuel	\$12,000.00
Compost cat	\$15,000.00	Supplies	\$6,000.00
Site Preparation	\$135,000	Maintenance	\$18,000.00
Grinder/Screenner	\$45,000.00	Carbon	\$80,000.00
Conveyor	\$15,000.00	Waste Away (Inoculant)	\$35,000
Skid steer	\$12,500.00	Miscellaneous	\$6,000.00
36 Containers	\$600,000.00	Insurance	\$12,000.00
Blowers	\$23,000.00	Taxes	\$2,000.00
Computer Process	\$72,500.00	Depreciation	\$40,000.00
Fork Lift	\$32,900.00	Interest	\$81,000.00
Storage Building	\$165,000.00	Testing	\$10,800.00
Electrical Installation	\$120,000.00	Phone	\$2,100.00
		Accounting	\$4,000.00
TOTAL	\$1,445,600.00	TOTAL	\$547,900.00

We will also continue our research to develop a mixture and process that will create a “fertilizer” that consistently achieves 3.0% nitrogen levels or greater. The 15 months of testing the prototype has proved this technology serves not only as a waste management solution, although it clearly is. We have demonstrated that we can create a compost with enough nutrient value that it will demand as much as \$200/ton retail according to OrganiSoil, LLC. While we have yet to achieve our goal of a 3% nitrogen fertilizer, we have been able to create a very valuable product. This product will allow us to achieve our initial goal of achieving a fully separate business creating and selling what was once considered waste.

**TEST RESULTS OF COMPOST @ VARIOUS STAGES DURING THE
15 MONTH PROTOTYPE PHASE:**

Age	~Temp.	Ammonia	Nitrate	Total N	P	K	Ag Ix	BAC	Stab.	Mat.	
New	NA	6150	9.9	3.4	2.9	1.9	11	72	14	0	
2 weeks	70 C	6550	5.3	1.9	3.2	2.2	6	79	11	0	
4 weeks	42-45 C	1570	6.6	1.8	2.3	1.5	7	17	8.8	50%	
6 weeks	15 C	1410	7.3	2.2	4	2.3	7	13	7.4	50%	
8 weeks	Ambient	1785	9.7	2.4	4.3	2.3	8	5.3	1.5	67%	
Previous	Test	Results:									
Brad M	NA	149	390	3	0.82	0.58	NA	0.7	0.4	100%	
Jan '06	NA	1705	0.6	2.3	4.2	2.1	10	14	8.3	62%	
July '05	NA	4615	4.7	4.2	2.5	1.3	13	12	13	0	
July '05	NA	9185	0	2.9	1.6	1	10	35	13	0	
Sep '05	NA	730	12	2.4	3.1	1.9	13	27	5.3	100	
Sep '05	NA	975	33	2.4	3.3	2	11	9.2	6.6	50%	
Sep '05	NA	855	204	1.7	2.4	2	10	9.1	5.2	20%	
Apr '06	NA	590	9.1	1.5	2.6	1.8	7	3.8	5.5	100%	
Apr '06	NA	1420	0.47	2.3	3.7	2.2	8	6.5	10	12%	Inoc
Apr '06	NA	13850	1.8	4.1	4.6	3.8	8	37	21	0	Manure
May '06	NA	151	5.2	2.2	2.4	1.5	7	10	6.2	100%	Lo Inoc
May '06	NA	348	0.36	2.4	2.5	1.4	7	7.5	7.9	100%	Hi Inoc
May '06	NA	150	170	2	2.9	1.7	8	13	8.5	100%	Inoc X 2

*Ag Index is a reading of total nutrient value. A score of 7 or above indicates an excellent product.

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