“AgriClean” Mesophilic Digester and “AgriJet” Flush System

FINAL REPORT

For the NC Attorney General-Smithfield Foods/Premium Standard Farms/Frontline Farmers Agreements

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Project Title:

AgriClean Mesophilic Digester and AgriJet Flush System

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Duration dates: August 6, 2003 to December 31, 2004 (extended to February 14, 2005)

Dates Covered by Report: January 5, 2005 to February 14, 2005.

Executive Summary

Installation of the AgriClean technology on the Bobby Ray Harris farm site located in Pitt County began in 2003. The farm site had 12 mechanically ventilated, fully slatted pit - recharge houses that housed approximately 12,000 total finishing head. The AgriClean technology included anaerobic mesophilic digestion and solid separation. During the construction and installation of the AgriClean components, an AgriJet system was installed in 5 of the 12 finishing houses to provide flush – style solid/waste removal from the houses through water pressure in July 2004 (Original goal was to install AgriJet system is all 12 houses). This component was not funded through the AG/SF/PSF/FF Initiative. Each of the 5 AgriJet installed houses was manually flushed daily into a 6000 gallon in-ground equalization (EQ) tank/ pump station. (Original design for AgriJet system included scheduled mechanical flushing, however, during the evaluation period this was not accomplished due to 3 phase power requirements). Waste was pumped from the EQ tank to the 255,000 gallon (total capacity) fixed-film mesophilic digester (MD) and then stored post digestion in a 39,000 gallon settling/ EQ tank. The technology was designed to pump the undigested and settled solids from the MD to the settling/ EQ tank and then through a Fan separator for additional solid removal with the liquid portion of the waste stream being delivered to the lagoon and the solid component being land applied or further processed. Each of the 7 remaining houses (no AgriJet installation) was emptied (flushed) into the lagoon twice a week. All houses were recharged with lagoon liquid. Biogas produced as result of mesophilic digestion was flared. Samples collections for nutrient analyses began in January 2005 and concluded on February 14, 2005 due to delays in technology operation. Mass balance could not be determined based on the AgriJet technology operating schedule (manual flushing of test houses) but was estimated using projected waste water produced per head as outlined in the technology permit provided by NCDENR.

During the technology start up phase, solid build up created challenges in the EQ tank / pump station and the 4" PVC lines transporting the waste water from the houses to the mesophilic digester. A grinder pump (150 gal/ min) had to be installed in the EQ tank/pump station to promote agitation and to reduce solid settling in the tank. Due to the distance necessary to transport the waste stream from the pump station to the MD, the PVC lines were often clogged with solids requiring sections of the lines to be "snaked" or blown with air pressure. This build up of solids in the lines also contributed a feedstock that was less desirable for the microbes in the MD. Each of these challenges created delays and inconsistent operation of the AgriClean technology. With manual operation of the AgriJet installed houses, the flushing schedule was dependent on the technology operator. Houses were not flushed on a specific timeline creating a buildup of solids in the houses as well as an overload to the EQ tank / pump station resulting in "overflow" into the lagoon (This overflow was included in the technology / permit operation as a safety mechanism to prevent discharge). Start up of the technology began during cool weather challenging the 95^{o}F desired mesophilic digester temperature since the MD was not insulated. This in turn reduced the opportunity for biogas production which was to be used to generated heat for the digester. Propane was utilized as an alternate heat source during start up but with record lows in temperature and the lack of insulation in the MD,

temperatures were still difficult to maintain beyond 80^{o}F. Initial attempts at solid separation (post settling tank) produced minimal solids due to improper wiring during sampling events. Separated solids were limited to one day of sampling and were land applied per the grower's waste utilization plan.

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Bobby Ray Harris Farm – AgriClean technology

Farm and Technology description:

The AgriClean technology was installed on the Bobby Ray Harris farm site located in Pitt County beginning in 2003. The farm site has 12 mechanically ventilated, fully slatted pit - recharge houses that house approximately 12,000 total finishing head. The AgriClean technology included anaerobic mesophilic digestion and solid separation. During the construction and installation of the AgriClean components, an AgriJet system was installed in 5 of the 12 finishing houses to provide flush – style solid/waste removal from the houses through water pressure. This component was not funded through the AG/SF/PSF/FF Initiative. Each of the 5 AgriJet installed houses was manually flushed daily into a 6000 gallon in-ground equalization (EQ) tank/ pump station. Waste water was agitated and pumped from the EQ tank to the 255,000 gallon (total capacity) fixed-film mesophilic digester (MD) (technology licensed from the University of Florida). The plastic media used in the MD were shipped in 24' lengths but were cut into 8' sections and bundled for installation into the MD due to their flexibility. Liquid from the digester was recirculated through a heat exchanger using a 5hp recycle pump and was mixed with influent from the pump station (house effluent) to provide the target operational temperature of 95^{o}F. Since system "start up" occurred in cool weather and due to the lack of digester insulation, propane was used as an alternate heat source in lieu of biogas for the mesophilic digester. The technology supplier reported digester temperature to be 86^{o}F in early January. The highest recorded temperature observed during site visits was 80.6^{o}F with most recordings in the mid 70^{o}F range (per system manager). Biogas production was observed (flare) during the last week of January, however, gas production was not measured (installed flow meter was not calibrated). Both undigested and settled solids and post digestion liquid were transferred (solids pumped / liquid based on overflow) and stored in a 39,000 gallon settling/ EQ tank. The technology was designed to pump the solids through a Fan separator for additional solid removal with the liquid portion of the waste stream being delivered to the lagoon and the solid component being land applied or further processed. Each of the 7 remaining houses (no AgriJet installation) was emptied (flushed) into the lagoon twice a week. All houses were recharged with lagoon liquid. Biogas produced as result of mesophilic digestion during the evaluation was flared (design provided biogas storage for use as heat source for mesophilic digester).

Figure 1. Process flow chart of the AgriClean technology.

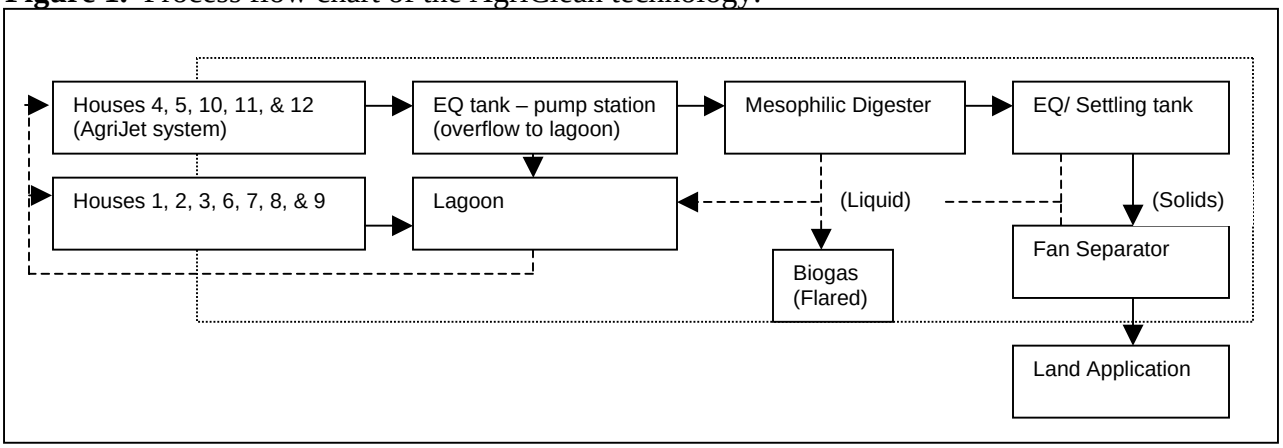
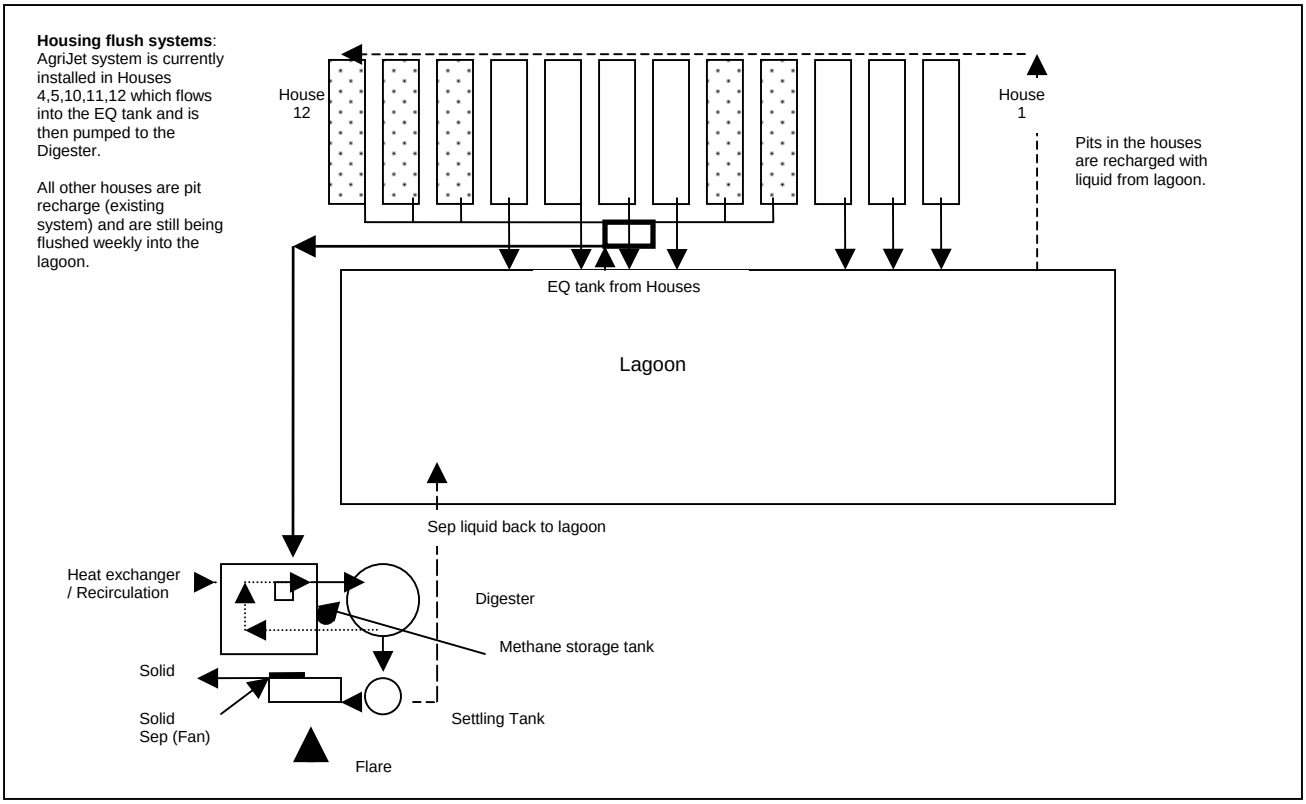


Figure 2. Schematic of AgriClean technology located on the Bobby Ray Harris farm site.



Sample Collections and Nutrient Analysis:

The AgriClean evaluation began January 5, 2005 and concluded February 14, 2005. Grab samples from the various technology components were collected weekly for a total

of 6 sampling events. All samples were analyzed at the North Carolina Department of Agriculture and Consumer Services (NCDA & CS) Agronomic Division analytical lab located in Raleigh, NC. Percent volatile solids were analyzed in the NCSU BAE service lab. Emissions monitoring by the OPEN (Odor, Pathogens, and Emissions of Nitrogen) team occurred during January 2005.

Table 1. The following table summarizes the sampling points, nutrient analyses (ppm), pH, and %DM for all sampling events. A complete data set of all sample collections is listed in Appendix A. Mean values (STDev) are listed below:

Sample	N(Total)	TKN	NH4-N	NO3-N	P	Zn	Cu	pH	DM%	%VS
House effluent (A/J[1])	1502 (666)	1502 (666)	1093 (383)	.18 (.07)	234 (83)	8.2 (5.3)	11.7 (12.2)	7.04 (.32)	1.04 (.50)	71.11 (4.8)
Mesophilic Digester (in)	1840 (427)	1840 (427)	1221 (125)	.22 (.18)	352 (90)	14.4 (3.8)	27.5 (14)	7.06 (.26)	1.42 (.69)	61.23 (17.7)
Mesophilic Digester (out)	1285 (88)	1285 (88)	1187 (123)	.22 (.07)	172 (36)	6.6 (2.6)	12.0 (5.8)	7.50 (.08)	.43 (.17)	52.75[2] (n/a)
Digester[3] Port 1	1534 (199)	1534 (199)	1245 (107)	.21 (.11)	257 (24)	15.2 (2.3)	28.3 (5.4)	7.34 (.07)	.60 (.18)	56.37 (2.5)
Digester Port 2	1839 (528)	1839 (528)	1261 (59)	.24 (.07)	334 (97)	22.5 (12.5)	42.3 (27.2)	7.27 (.09)	.98 (.79)	64.82 (7.4)
Digester[2] Port 3	1964 (n/a)	1964 (n/a)	1332 (n/a)	.33 (n/a)	927 (n/a)	61.4 (n/a)	96.5 (n/a)	7.53 (n/a)	1.75 (n/a)	71.48 (n/a)
Settling tank (out)	1278 (72)	1278 (72)	1160 (126)	.21 (.06)	140 (19)	3.8 (1.9)	6.4 (2.9)	7.57 (.08)	.23 (.12)	38.32 (4.6)
Lagoon[4]	603 (47)	603 (47)	560 (28)	.64 (.06)	77.8 (5.9)	1.3 (1.1)	.87 (.11)	7.68 (.10)	.08 (.03)	35.05 (2.1)
Solids[2]	25148 (n/a)	25139 (n/a)	1000 (n/a)	8.91 (n/a)	3373 (n/a)	212 (n/a)	479 (n/a)	6.47 (n/a)	29.75 (n/a)	96.63 (n/a)

[1]A/J – AgriJet waste removal system
[2]1 sample analyzed
[3]Ports (1-3) installed in the MD for sampling undigested and settled solids.
[4]Lagoon received waste from conventional houses, as well as, AgriClean technology houses.

If one assumes an average daily volume of 13,000 gallons (2.7 gallons of waste/head/day @135 lbs. steady state live wt. per NCDENR permit for 5 houses) of waste water is transported through the AgriClean technology components (finishing houses to the mesophilic digester to settling tank to lagoon), Table 1 can be used to estimate recovery or retention of nutrients. Samples collected from the three sampling ports located in the lower portion of the MD during the evaluation reflect accumulation of settled solids and or biomass, as well as, nutrients (Table 1 and Figure 6 b). Therefore, the reduction in % dry matter, volatile solids, and nutrients observed in the waste stream being transported through the MD would need to be corrected for the volumes of solids represented from

these 3 ports. These volumes of solids are unknown. Also, the extent of digestion of the solids in the MD through gas yields is not possible to predict since biogas data was not available (meter not calibrated by technology supplier). With the above stated limitations, the apparent "retention" of nutrients by the digester and settling tank can only be estimated and are listed in Table 2.

Table 2. The following table summarizes % reductions / increases in nutrients (liquid fraction) for the AgriClean technology components based on the assumption of a consistent volume and displacement of waste water through the system.

Sample	N(Total)	TKN	NH4-N	NO3-N	P	Zn	Cu
	%						
MesophilicDigester (in - out)*	30	30	3	-	51	54	56
Settling tank (in - out)	0.5	0.5	2	4	19	42	47

* Please note on Table 1, settling of undigested solids and / or biomass in MD, shown as Port 1, 2, & 3.

Figure 3. Nutrient Analysis for Nitrogen.

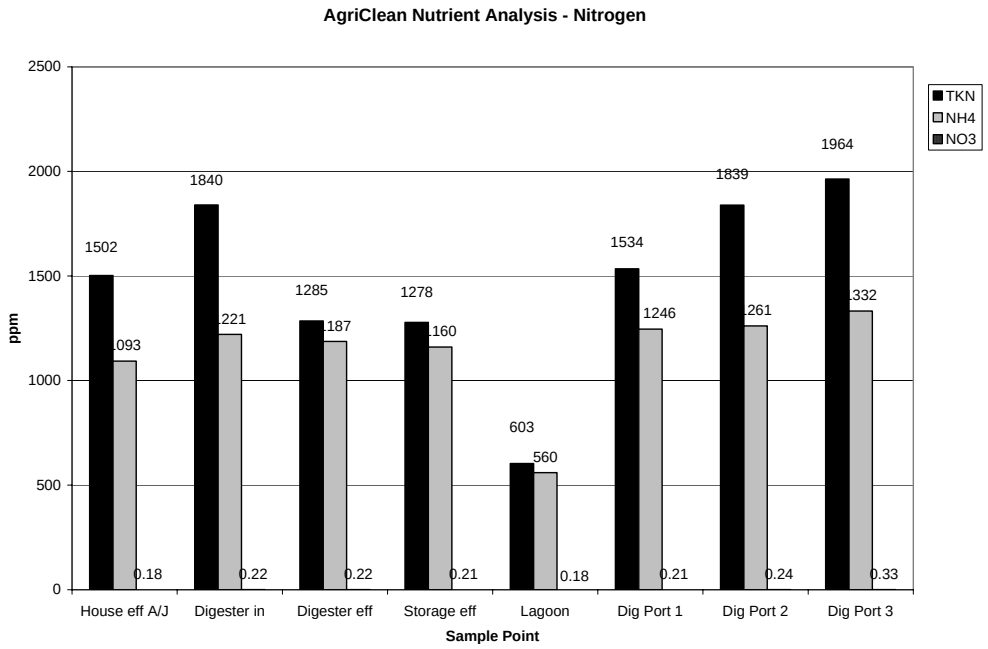


Figure 4. Nutrient Analysis for P, Zn, Cu.

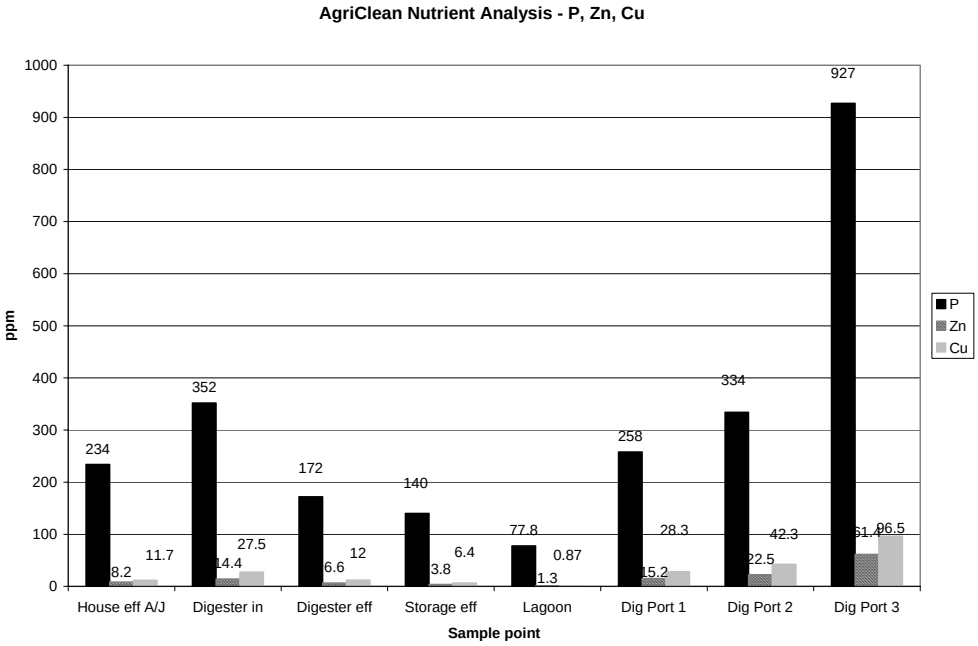
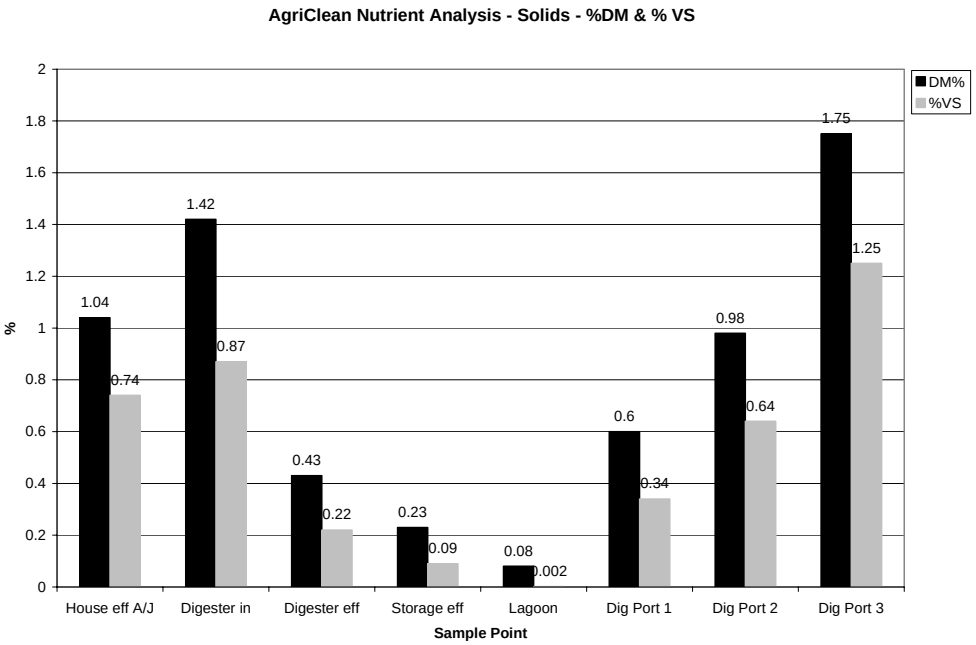


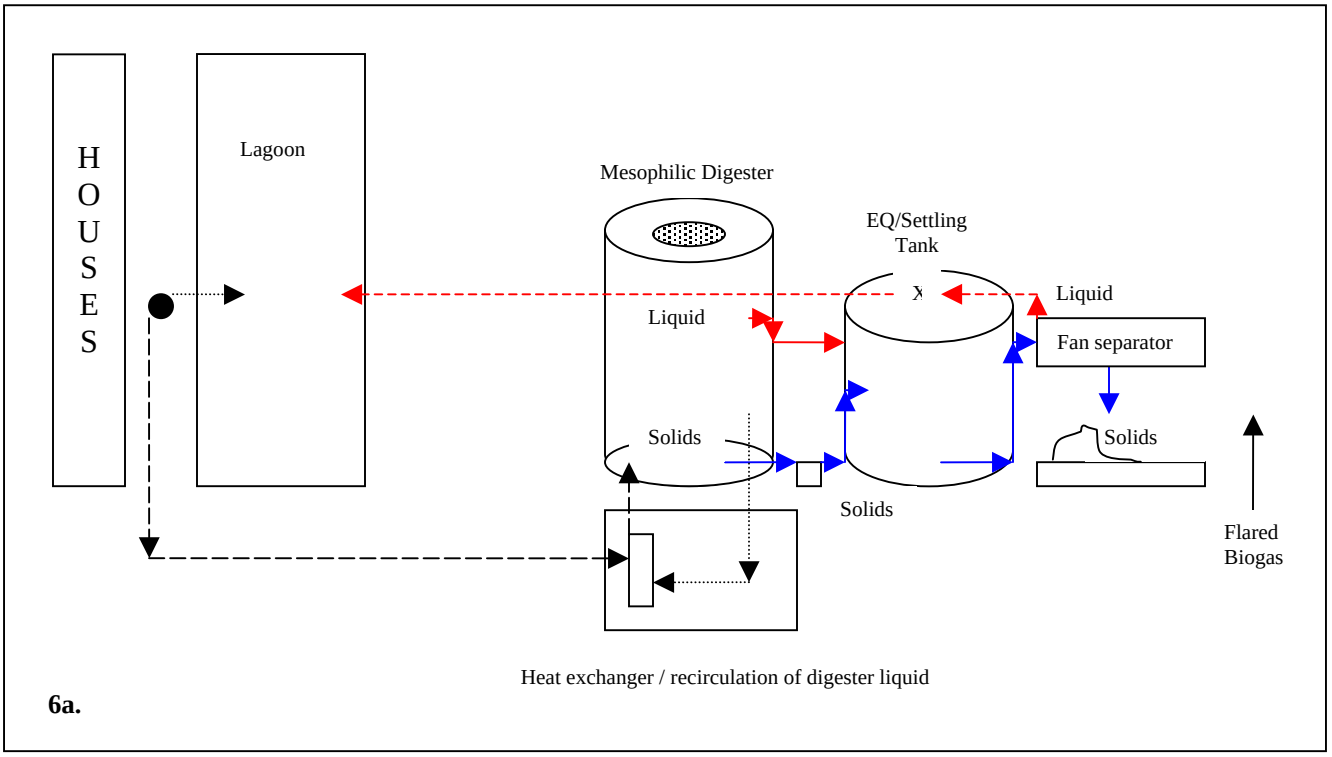
Figure 5. Analyses for %DM and % VS.



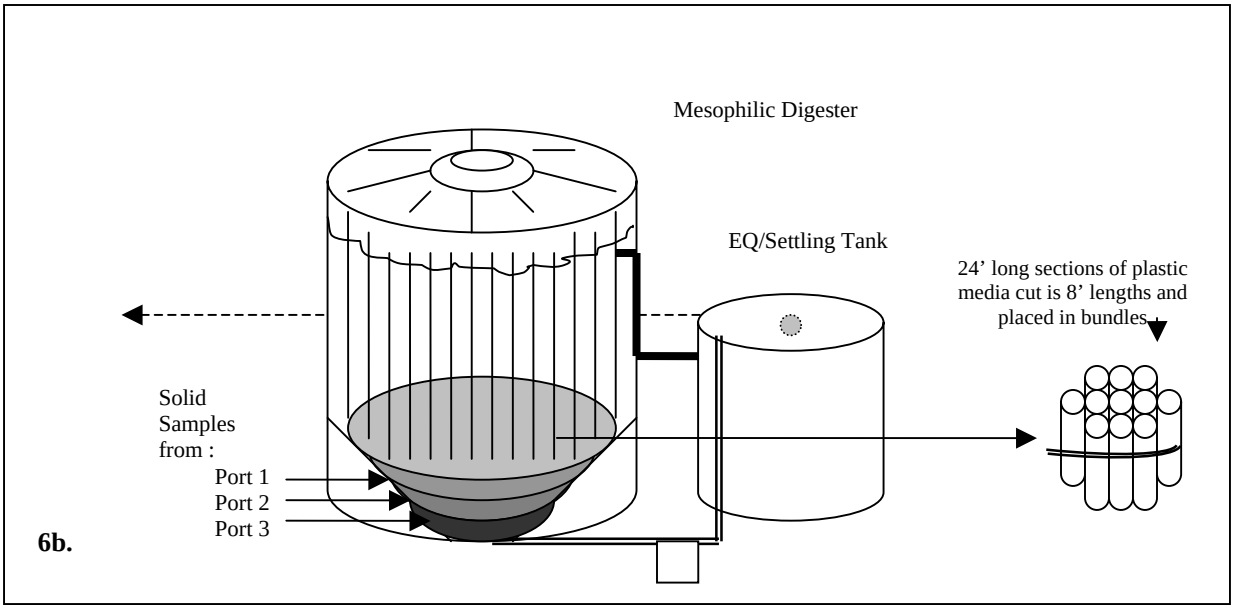
Flow rates and volumes:

Total volume from the 5 AgriJet houses was estimated to be approximately 12, 960 gallons per day (2592 gallons / house at 135 lbs steady state live weight – permit w/ NCDENR). Houses were designed to flush in sequence to avoid "overflow" into the lagoon and to allow a specific volume to be pumped to the MD. If houses were not manually flushed daily and/or were not flushed in a sequence (one row per house at a time) the waste stream being flushed to the EQ tank / pump station would backup into the houses or would overflow in the lagoon. This made measurement of the total volume difficult. If the MD received all of the waste water from the AgriJet houses, it is estimated a retention time of approximately 19 days would occur in the MD although per the technology supplier, the fixed –film MD was chosen with the goal of having a 2-6 day HRT utilizing waste from 12 houses. Volume flowing (overflow from MD) into the EQ/ settling tank was based on waste water received from the houses into the MD. Volume flowing into the lagoon from the settling tank was dependent on influent into the settling tanks. Undigested and/or settling solids in the MD were pumped into the settling tank periodically. Clogged lines from the MD to the settling tank and improper wiring of the solid separator (backwards) prevented consistent transfer of solids through the Fan separator. During the evaluation, the Fan separator was utilized once. No volumes of solids were determined.

Figures 6a & 6b. Schematics of AgriClean technology waste water flow and anaerobic fixed-film mesophilic digester.



6a.



6b.

Operational Overview:

The AgriClean technology was evaluated for approximately 6 weeks. Flow rates and volumes were difficult to determine due, in part, to non-sequential manual flushing of the barns via operation of the AgriJet system and build up of solids in the lines transporting the waste stream.

All houses with the AgriJet system were manually flushed and varied based on the operator's schedule. An agitating pump was installed in the pump station receiving waste from the 5 AgriJet houses to promote mixing and prevent the pipes from clogging, however, the distance necessary to transport the waste from the pump station to the MD created some settling in the lines also contributing to the clogged PVC lines. Operation was delayed numerous times due to solid build up in pipes delivering the waste flushed from the houses to the mesophilic digester.

Figure7. Images of solid build up in PVC lines.

The system "start up" occurred in cool weather and propane was used as an alternate heat source for the mesophilic digester. The technology supplier reported digester temperature to be 86^{o}F in early January (target operational temperature was 95^{o}F). The highest recorded temperature observed during site visits was 80.6^{o}F with most recordings in the mid 70 range (per system manager). Inadequate feeding (due to solids build up in PVC lines) of the microbes in the anaerobic mesophilic digester also reduced the opportunity of biogas production. Biogas production was observed (flare) during the last week of January, however, gas production was not measured (installed flow meter was not calibrated). Without the flow data, digester efficiency can only be estimated.

The Fan separator installed to separate the undigested and settled solids from the EQ/ settling tank was operated minimally (motor found to be operating backwards) resulting in one sample collection. During the evaluation period, the farm owner land applied the solids separated with the fan separator.

Conclusions:

The AgriClean technology was fully operational for approximately 6 weeks. While there was evidence of biogas production (noted as flare) it is not possible to determine the

extent of digestion in the anaerobic mesophilic digester component based on actual measurements (none recorded). Nutrient recoveries reflect retention in the settled material found in the bottom section of the digester. Total nitrogen reduction of 30% was observed in the MD in the liquid fraction of the waste stream with a 3% reduction noted in NH4-N and 50-60% reduction observed in P, Zn, and Cu. Additional reductions in the liquid fraction were also noted in the settling tank with most occurring in P, Cu, and Zn further demonstrating the effect of settling. Although limited in operation, the Fan separator appeared to remove solids from a <2% DM waste stream (settled solids in settling tank) as designed.

The retention of solids in the digester created concerns regarding long term operation of the mesophilic digester. If these can be utilized as originally designed either through digestion or solid separation (transfer to settling tank), this concern may be resolved. Due to the short term operation of the AgriClean technology, it is difficult to determine whether these solids are the result of failure of the system to reach "steady state" operation (promoting digestion) or a problematic aspect of the technology. Maintenance of the mesophilic temperatures are also a concern since it was difficult to maintain temperatures above 80^{o}F during the cooler months of the year which in turn limited biogas production. Insulation of the above ground MD could also be included as a consideration. Overall, solids seemed to be the biggest challenge to the AgriClean technology, as demonstrated through clogged lines in the transfer of waste from the houses to technology components and through settling. If the complete waste stream is required for optimum biogas production by the mesophlic digester a gravity fed waste receiving component may be a better option than pump or lift stations.

Acknowledgements:

We appreciate the cooperation and assistance in procurement of production and nutrient management information by Premium Standard Farms necessary for data reduction as well as the farm owner, Bobby Ray Harris. We also thank the North Carolina Department of Agriculture and Consumer Services (NCDA & CS) Agronomic Division analytical lab located in Raleigh, NC and NCSU BAE service lab for their assistance with sample analysis.

Appendix A

Nutrient Analysis Data

As reported by NCDA - for liquid samples N(total) = TKN(free and bound NH4) + N03 - All values reported in ppm except pH and %DM - ppm unless otherwise noted.													
Date	**Sample**	**N (total)**	**TKN**	**IN-N**	**NH4**	**NO3**	**OR-N**	**P**	**Zn**	**Cu**	**pH**		
1/5/2005	Digester in	2412.97	2408	1169	1164	4.97	1240	376	15.8	38.4	6.92		
	Digester eff	1308.52	1304	1065	1060	4.52	239	151	3.85	7.06	7.5		
	Storage eff	1304.07	1300	1077	1073	4.07	223	124	2.59	4.11	7.64		
	Dig Port 1	1764.14	1760	1097	1093	4.14	663	240	13.3	26.8	7.25		
	Dig Port 2	2890.35	2887	1182	1179	3.35	1705	512	47.1	94.2	7.19		
	Lagoon	668.97	666	518	515	2.97	148	79.6	1.17	0.98	7.77		
1/13/2005	Digester in	1935.42	1935	1126	1125	0.42	809	430	15.1	31.9	7.26		
	Digester eff	1385.29	1385	1139	1139	0.29	246	170	6.7	13.4	7.55		
	Storage eff	1261.27	1261	1103	1103	0.27	158	125	2.79	5.47	7.57		
	Dig Port 1	1469.27	1469	1157	1157	0.27	312	222	13.7	27.9	7.33		
	Dig Port 2	1644.31	1644	1226	1226	0.31	418	383	23.1	48.5	7.25		
	Lagoon	545.26	545		546	0.26		80.3	0.7	0.71	7.65		
1/17/2005	Digester in	2027.29	2027	1370	1370	0.29	657	408	17.7	41.6	6.7		
	Digester eff	1278.2	1278	1197	1197	0.2	80.4	144	5.65	7.95	7.57		
	Storage eff	1196.17	1196	1033	1033	0.17	163	169	7.06	10.3	7.51		
	Dig Port 1	1448.22	1448	1225	1224	0.22	224	251	18.4	34.6	7.37		
	Dig Port 2	1617.21	1617	1269	1268	0.21	349	262	18	34.9	7.23		
	Lagoon	560.18	560	553	553	0.18	5.63	69.7	3.53	0.82	7.58		
	House eff A/J	2443.21	2443	1520	1519	0.21	923	355	15.9	29.2	6.71		
	House eff cnv	711.17	711	605	605	0.17	106	99.7	4.9	4.73	7.47		
1/26/2005	Digester in	1368.16	1368	1343	1343	0.16	24.9	202	7.76	15.1	7.33		
	Digester eff	1171.16	1171		1351	0.16		224	10.1	19.6	7.39		
	Storage eff	1246.16	1246		1306	0.16		148	4.01	7.71	7.48		
	Dig Port 1	1272.17	1272		1355	0.17		271	13.9	28.1	7.28		
	Dig Port 2	1613.18	1613	1358	1358	0.18	255	283	13.9	27.3	7.26		
	Lagoon	587.08	587		590	0.08		87	0.91	0.89	7.56		
	House eff A/J	931.12	931	790	790	0.12	142	205	6.04	10.9	6.89		
	House eff cnv	1177.06	1177	1075	1075	0.06	102	167	2.14	3.39	6.92		
	House eff cnv	1535.23	1535	692	692	0.23	843	538	38.5	80.7	6.57		

Date	Sample	N (total)	TKN	IN-N	NH4	NO3	OR-N	P	Zn	Cu	pH		
2/7/2005	Storage eff	1388.25	1388	1285	1285	0.25	103	136	2.5	4.52	7.67		
	Dig Port 1	1785.35	1785	1356	1356	0.35	428	287	18	33	7.46		
	Dig Port 2	1836.32	1836	1263	1262	0.32	574	281	18.2	30.2	7.44		
	Lagoon	621.17	621	567	567	0.17	53.7	75.4	0.6	0.99	7.72		
	House eff A/J	1476.26	1476	1312	1312	0.26	164	167	3.74	2.52	7.45		
	Solids	25147.91	25139	1009	1000	8.91	24130	3373	212	479	6.47		
2/14/2005	Digester in	1464	1464	1105	1105	0	359	343	15.7	10.5	7.08		
	Digester eff												
	Storage eff												
	Dig Port 1	1469.05	1469	1288	1288	0.05	181	274	14.1	19.4	7.34		
	Dig Port 2	1439.2	1439	1273	1273	0.2	165	285	14.4	18.8	7.26		
	Dig Port 3	1964.33	1964	1332	1332	0.33	632	927	61.4	96.5	7.53		
	Lagoon	636.2	636	587	587	0.2	49.6	74.5	1.06	0.8	7.82		
	House eff A/J	1158.13	1158	749	749	0.13	409	208	7.16	4.3	7.12		

As reported by NCDA													As Reported by BAE		
Date	**Sample**	**Code**	**K**	**Ca**	**Mg**	**S**	**Fe**	**Mn**	**B**	**Cl**	**Na**	**DM%**	**%TS**	**%VS**	**COD**
1/5/2005	Digester in	BRH2	1522	386	190	144	32.8	6.11	2.79	692	335	1.83			
	Digester eff	BRH3	1207	185	63.3	53.4	9.47	1.46	2.52	565	302	0.27			
	Storage eff	BRH4	1099	171	49.2	46.4	6.03	0.98	2.39	591	281	0.15			
	Dig Port 1	BRH5	1281	244	124	118	30	4.12	2.49	603	328	0.77			
	Dig Port 2	BRH6	1142	441	289	246	107	13.7	2.35	577	266	2.41			
	Lagoon	BRH1	1066	127	24.3	35.8	2.79	0.39	2.29	508	277	0.06			
1/13/2005	Digester in	BRH2	1446	369	248	127	35.1	6.68	2.86	721	319	2.13			
	Digester eff	BRH3	1068	205	74.9	61.2	15.9	2.29	2.36	596	246	0.49			
	Storage eff	BRH4	1089	195	51.3	42.6	7.21	1.19	2.32	595	270	0.37			
	Dig Port 1	BRH5	1184	263	105	89.9	32.1	4.14	2.56	586	280	0.61			
	Dig Port 2	BRH6	1159	342	213	136	55.8	7.83	2.57	608	263	1.28			
	Lagoon	BRH1	937	130	27.1	34.7	2.9	0.5	2.11	524	231	0.13			
1/17/2005	Digester in	BRH32	1448	337	248	137	34.6	6.56	2.68	795	341	1.68			
	Digester eff	BRH33	1119	201	62.5	49.2	9.75	1.51	2.3	610	276	0.31			
	Storage eff	BRH34	939	199	99	51.4	14.7	2.27	1.94	537	247	0.31			
	Dig Port 1	BRH35	1165	255	131	102	36.6	4.73	2.44	604	282	0.73			
	Dig Port 2	BRH36	1179	265	144	106	34.9	4.77	2.35	628	293	0.76			
	Lagoon	BRH31	891	150	27.1	29.7	3.07	0.44	1.74	516	227	0.1			
	House eff A/J	BRH38	1290	327	204	121	31.4	5.8	2.35	820	289	1.74			
	House eff cnv	BRH39	913	164	51.1	38.7	8.15	1.14	1.82	525	242	0.31			
1/26/2005	Digester in	BRH42	1351	250	87.9	78.9	17.6	2.61	2.85	645	323	0.43	0.8	48.75	
	Digester eff	BRH43	1317	254	108	79.8	22.4	3.29	2.76	631	311	0.63	0.91	52.75	
	Storage eff	BRH44	1254	192	52.6	49.5	9.67	1.45	2.7	648	298	0.26	0.65	41.54	
	Dig Port 1	BRH45	1448	289	139	98.7	30.6	4.43	3	697	341	0.72	1.04	55.77	
	Dig Port 2	BRH46	1439	277	145	101	30.4	4.48	2.99	644	339	0.75	1.15	58.26	
	Lagoon	BRH41	1138	166	29.9	38	3.64	0.5	2.4	518	286	0.07	0.46	32.61	
	House eff A/J	BRH48	1310	233	96.9	76.8	14.1	2.69	2.65	606	321	0.98	2.1	74.29	
	House eff cnv	BRH49	1249	161	88.7	56.7	7.6	1.61	2.57	637	301	0.5	1.62	70.98	
	House eff cnv	BRH40	619	631	408	174	92.2	13.2	1.79	229	221	2.63			

Date	Sample	Code	K	Ca	Mg	S	Fe	Mn	B	Cl	Na	DM%	%TS	%VS	COD
2/7/2005	Storage eff	BRH54	1189	203	47	48.7	6.32	1.05	1.94	631	294	0.06	0.57	35.09	3090
	Dig Port 1	BRH55	1338	260	149	112	37.3	5.15	2.14	665	319	0.46	0.94	54.26	9933
	Dig Port 2	BRH56	1240	273	144	122	35.7	4.88	2.09	609	310	0.43	2.51	72.91	42200
	Lagoon	BRH51	1027	152	27	33.3	2.87	0.42	1.57	536	266	0.06	0.44	36.36	2407
	House eff A/J	BRH58	907	177	66.7	83.5	6.96	1.57	1.46	515	265	0.28	0.9	65.56	13250
	Solids		5264	5561	2183	3501	707	86.9	30.6	1834	1136	29.75	33.87	96.63	%mc=
															66.13
2/14/2005	Digester in	BRH72	1402	316	200	126	23.8	5.37	2.72	722	325	1.02	1.94	73.71	28050
	Digester eff	BRH73													
	Storage eff	BRH74													
	Dig Port 1	BRH75	1138	238	144	94.6	28.1	4.58	2.42	595	283	0.31	1.1	59.09	16540
	Dig Port 2	BRH76	1173	235	146	111	27.9	4.59	2.54	595	287	0.24	1.28	63.28	18600
	Dig Port 3	BRH77	1424	534	654	255	121	20.8	2.91	609	336	1.75	2.84	71.48	38600
	Lagoon	BRH71	960	140	24.5	41.2	2.87	0.42	2.02	516	245	0.05	0.47	36.17	2587
	House eff A/J	BRH78	793	201	135	87.8	13	2.87	1.96	408	236	0.55	0.98	73.47	12060