PAGEL'S PONDEROSA DAIRY REPORT

ENVIRO® LAGOON

DAIRY WASTE
MANAGEMENT SOLUTION

SOLUTIONS® 4Earth

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PAGEL'S PONDEROSA DAIRY
John T. Pagel & Family

PROACTIVE SOLUTIONS USA, LLC

Effects of EnviroLagoon® on a Dairy Employing An Anaerobic Digestion System

Study Conducted From June 2014 to March 2015

Pagel's Ponderosa Dairy

- 4500 head dairy operation in Kewaunee, WI
- 250,000 gallons of manure slurry daily
- DVO anaerobic digestion unit with post digestion dried solids recovery
- Trial One: June to September 2014
  40 gallons/week introduced in reception pit
- Trial Two: January to March 2015
  40 gallons/week added directly into digestor

Observations From Both Trials

- Increased recovered manure solids, as well as methane, during both trials
- Energy output increased during trial one
- Hydrogen Sulfide decreased during both trials
- Struvite build-up was reduced after trial one
  Results not available yet for trial two

Benefits

- Reduction of solids build-up in digester
- Reduced maintenance costs of removing solids and increased capacity of digester
- Reduction of Hydrogen Sulfide increases longevity of iron oxide filtration chips
- Increased recovered manure solids were available for on-farm bedding and sale to other farms
- Reduced jetter costs for struvite removal in plumbing

TESTING ENVIROLAGOON® ON A DAIRY EMPLOYING AN ANAEROBIC DIGESTION SYSTEM

RESEARCH CONDUCTED BY SOLUTIONS 4EARTH® IN COOPERATION WITH PROACTIVE SOLUTIONS USA

PAGEL'S PONDEROSA DAIRY, KEWAUNEE, WI

October 2014

Introduction

A study was conducted on the performance of EnviroLagoon® in anaerobic digestion systems by ProActive Solutions and Pagel's Ponderosa Dairy (PPD) in cooperation with Solutions 4Earth®. Pagel's Ponderosa Dairy owns and operates an anaerobic manure digestion system for their 4,500 head dairy operation in Kewaunee, WI. Their interest in the use of EnviroLagoon was to see if the product provides for increased methane levels and reduced hydrogen sulfide levels.

The original protocol is in the attached appendix.

In the spring of 2014, PPD aimed for the anaerobic digestion system to attain a level of "steady-state". Manure samples were taken immediately before and after the initial treatment and, thereafter, re-sampled at monthly intervals. At each sampling date, manure samples were taken before and after from the digester and after solids removal, as well as after drying of the solids. PPD also monitored and recorded digester gas production (methane, carbon dioxide, hydrogen sulfide), as well as daily oxygen and power outputs.

After steady-state was achieved and the system initially sampled, 20 gallons of EnviroLagoon was poured into the pre-digester agitation tank on Monday and Thursday every week. The initial treatment date was June 2, 2014.

This treatment continued until August 29, after which it was discontinued. Beginning September 5, manure was treated with 30 gallons of EnviroLagoon on Monday and Thursday every week through September 29, 2014. As with the prior weeks, EnviroLagoon was agitated and poured into the pre-digester agitated manure holding cell. The regular recommended rate provided optimum results without the expense of going to an increased rate of EnviroLagoon.

Results and Discussion

Daily gas levels were somewhat variable during the entire trial. Averages were calculated from these daily gas levels before and after treatment.

The treatment of manure with EnviroLagoon increased methane production and slightly increased power production after the initial treatment. Increasing the EnviroLagoon rate also increased methane production.

The generation of hydrogen sulfide remained low and continued to decrease after treatment with the product. Levels initially decreased by more than 50%. When EnviroLagoon was increased, hydrogen sulfide (H_2S) also increased slightly but not to the original pre-treatment levels. This was most likely a result of general increase in microbial growth. Reduction in H_2S can help lengthen the amount of time before recharging bio-filters that are used to eliminate the expulsion of this gas into the atmosphere. What is significant to point out is that bio-filters were recharged a month before the trial was initiated and sensors were placed after the filters. This can be a factor in reduced H_2S levels, however, it is also important to understand that levels continued to decrease after treatment commenced and did not increase.

Oxygen levels dropped to zero after initial treatment with EnviroLagoon, but began to appear roughly 1.5 months after initial treatment and increased before plateauing in August. The increase in rate of EnviroLagoon did not appear to have any significant effect on the daily oxygen levels (see Figure 7). This suggests there is another reason for the increased oxygen levels, most likely attributed to the physical system.

Carbon dioxide levels seemed to be consistent throughout the trial regardless of treatment.

An increase in solids production was also reported. Evidently, dried solids are re-used after processing for bedding, providing value to this material. PPD's reports that in July and August of 2013 they averaged about 15 loads of dried solids per day. In 2014, during the same period, they averaged 25 loads per day. Each load is estimated at about 8.5 cubic yards. Since energy production was not decreased and solids production was increased, there is an increase in net value to this dairy. Analysis shows that percent solids (from manure samples) has decreased slightly but is consistent over time. While 1,000 heifers were added to production *before* this trial, the increase in animals does not account for the significant increase in solids measured post treatment. This suggests that more total solids are going through the process and solids are not building up in the digester. If this is true, then this will avoid or delay costly clean out operations.

Additionally, the dairy analyzed their piping system for buildup of struvite using a "snaked" camera system in September 2014. Struvite deposition was minimal compared to the same period last year. Struvite is a crystalline mineral consisting of magnesium ammonium phosphate. It builds up in alkaline conditions and is a common issue with waste management systems. Removal of struvite deposits from piping using acid treatments and physical scraping/grinding is a costly process.

In summary, treatment of manure immediately before the anaerobic digester had a positive effect on the operation of the digester by maintaining or increasing methane and energy production, reducing hydrogen sulfide production, enhancing solids throughput and possibly reducing buildup of struvite deposits on internal piping.

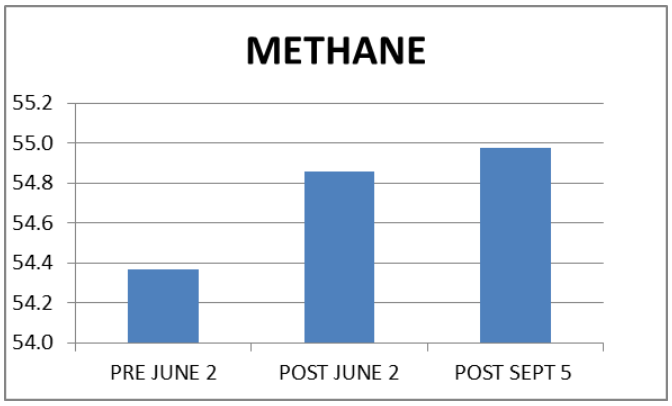

Figure 1. Average daily methane concentration (%) in the anaerobic digester as affected by addition of EnviroLagoon on June 2 at 20 gallons added 2 times per week and on September 5 at 30 gallons added 2 times per week.

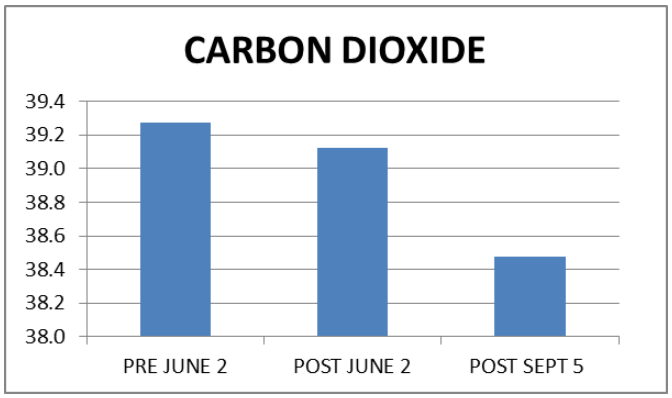

Figure 2. Average daily carbon dioxide concentration (%) in the anaerobic digester as affected by addition of EnviroLagoon on June 2 at 20 gallons added 2 times per week and on September 5 at 30 gallons added 2 times per week.

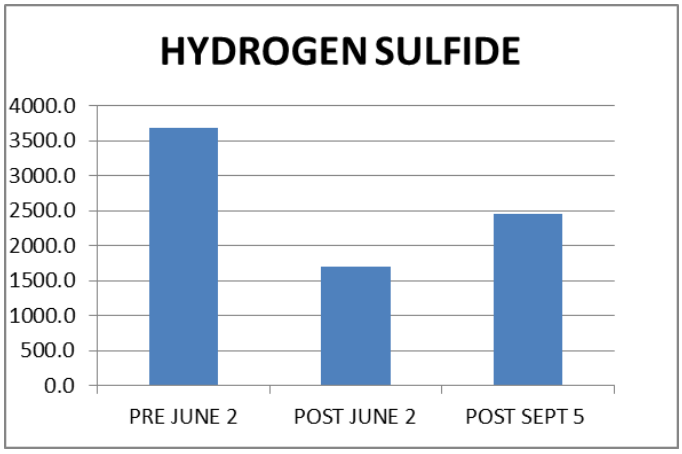

Figure 3. Average daily hydrogen sulfide concentration (ppm) in the anaerobic digester as affected by addition of EnviroLagoon on June 2 at 20 gallons added 2 times per week and on September 5 at 30 gallons added 2 times per week.

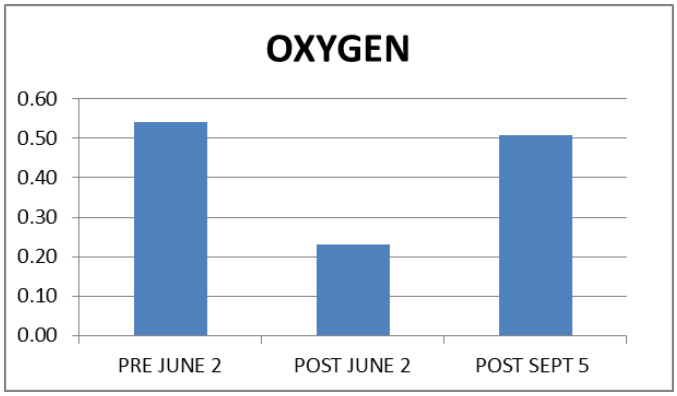

Figure 4. Average daily oxygen concentration (%) in the anaerobic digester as affected by addition of EnviroLagoon on June 2 at 20 gallons added 2 times per week and on September 5 at 30 gallons added 2 times per week.

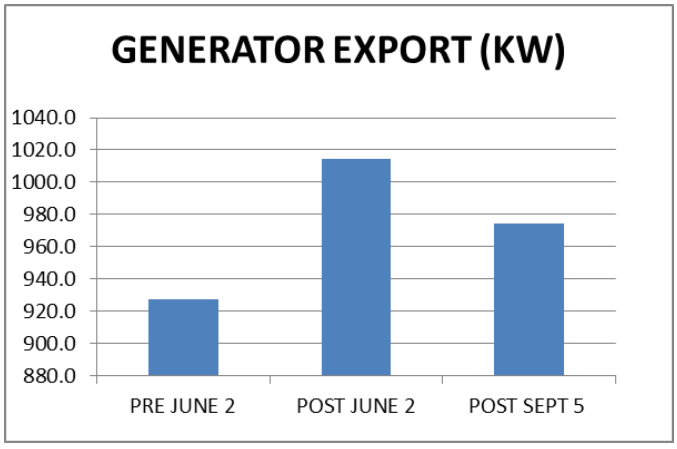

Figure 5. Average daily generator export in kilowatts as affected by addition of EnviroLagoon on June 2 at 20 gallons added 2 times per week and on September 5 at 30 gallons added 2 times per week.

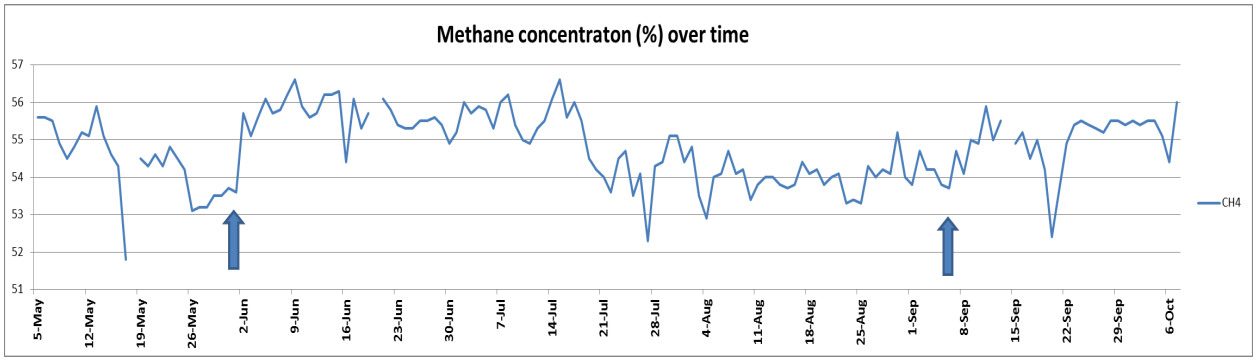

Figure 6. Daily percent methane over time. The first arrow on the left is when EnviroLagoon treatment was initiated at 20 gallons at 2 times per week. The second arrow is when EnviroLagoon was added at 30 gallons 2 times per week.

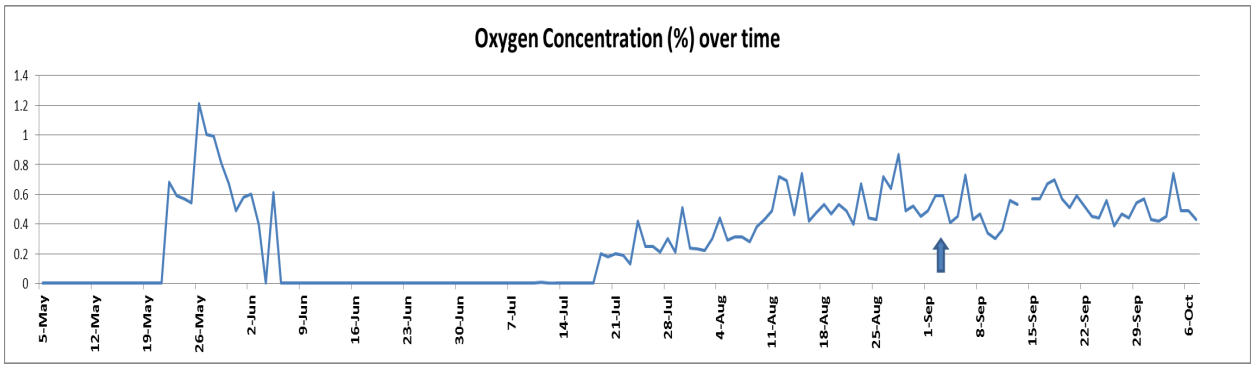

Figure 7. Percent oxygen in anaerobic digester over time. It appears that when oxygen was introduced, methane decreased until the EnviroLagoon rate was increased. Oxygen seemed largely unchanged after the increase in EnviroLagoon rate.

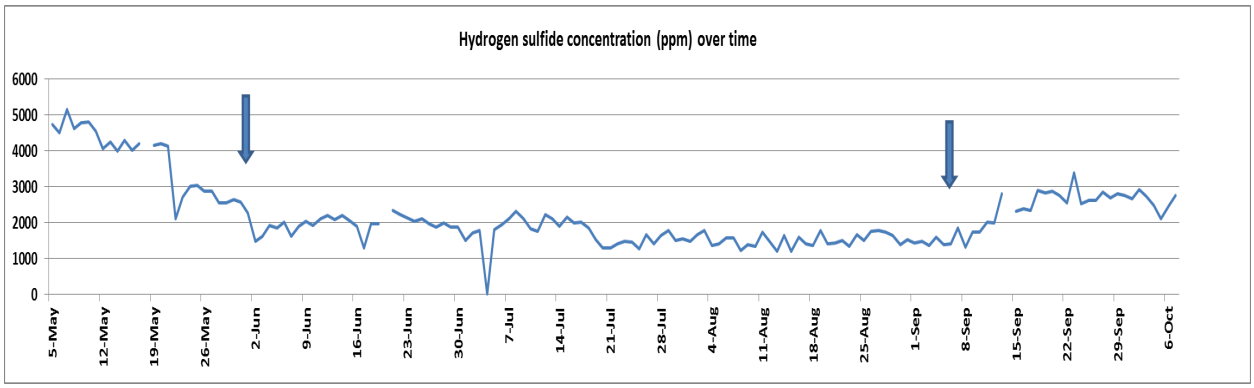

Figure 8. Concentration of hydrogen sulfide inside the anaerobic digester over a period of time. Hydrogen sulfide decreased after addition of EnviroLagoon, and stayed low until the EnviroLagoon rate increased. Since EnviroLagoon enhances microbial growth, both methane and hydrogen sulfide are presumably enhanced. While rate can be increased to enhance methane production, this may not be of value if hydrogen sulfide is to be minimized.

APPENDIX – Original Protocol

PROTOCOL FOR TESTING ENVIROLAGOON® WITH A DAIRY EMPLOYING AN ANAEROBIC DIGESTION

PAGEL'S PONDEROSA DAIRY, KEWAUNEE, WI

Background

Pagel's Ponderosa Dairy (PPD) is a dairy that utilizes an anaerobic digestion system to process manure before entering a series of lagoons prior to being applied to local agricultural crops. The system employs a sluice system where manure (from animal areas) is pushed into a central canal and then is flushed ultimately into a collection vessel that then agitates and meters the manure slurry into the anaerobic digester. The anaerobic digester is a constant flow, steady state system with the main purpose to produce methane for production of energy. Other unwanted gases such as hydrogen sulfide are filtered out using a series of bio-filters.

Manure slurry enters the system and it goes through a series of cells inside, which takes a period of about 16 days to go through the process. The digester is monitored for various gases including methane (CH_4), hydrogen sulfide (H_2S) and oxygen (O_2). After digestion, the solids are separated from the liquid. The solids are then dried, using a flash dryer and used for bedding.

Part of the liquid following digestion and solids removal, enters the lagoon system and part is recycled and used to flush the manure in the sluice systems. So, in a manner of speaking, the liquid is recycled except for a small fraction that enters the lagoon system (approximately 40%). The lagoon system is a series of four (4) lagoons where the water is somewhat siphoned off the top of each previous lagoon as water post-digestion traverses the series of lagoons. The liquid in the fourth lagoon is then used to apply to agricultural crops. At that point the liquid have very low amount of solids to avoid any clogging of application devices.

Some of the issues that may be of importance to PPD include:

- Flow of manure into the anaerobic digester
- Level of solids in the digester
- Reduction and quality of the solids post-digestion
- Increase in methane production and decrease in hydrogen sulfide production

This dairy is primarily interested in determining if the addition of EnviroLagoon will enhance the performance of the anaerobic digester. The digester is a significant

contributor to the economics of the operation via the generation of energy. An enhancement to the process will improve economics as well as any efficiency created in the process in the way of hydrogen sulfide reduction or solids reduction.

General Approach

The general approach is to introduce EnviroLagoon in the centralized collection vessel immediately before entrance into the anaerobic digestion system. This will isolate the effect of EnviroLagoon on the performance of the digestion system. The collection vessel is routinely agitated and this will be ideal to assure EnviroLagoon is mixed into the manure slurry. The digestion system will be monitored before the introduction of EnviroLagoon to establish base-line data. Once this data is collected and the Pagel's managers are satisfied the system is running at a steady state, then the treatments of EnviroLagoon will occur for about four (4) weeks. At that period, a decision is to be made to either continue with the current program, adjust the program by either increasing total dosage or rate of addition. It is advised that treatments are continued until the decision is made.

Parameters to be measured before EnviroLagoon treatment and every month after EnviroLagoon treatment is initiated include:

- BOD before and after digestion
- Solids before and after digestion (solids and % volatile solids)
- Plant nutrients before and after digestion (Total N, Phosphate P, K, Ca, Mg, Sulfate S, Fe, Mn Zn, Cu, B, Na, Cl) as well as pH and EC
- Any change in solids/sludge in digester
- Change in biological nature of solids (Test solids for bacteria)

Measured two to three times daily. Particularly monitor change after introduction of EnviroLagoon

- Change in methane production
- Change in hydrogen sulfide production
- Change in power output

Currently, our recommended application rate is determined by taking the number of animal units, which is approximately 4,500, and using that number to calculate the rate of addition. This would be 4,500 X 8 gallons per 1,000 head per week. This comes to 40 gallons per week and is considered the maintenance rate (1X). Typically a shock treatment is utilized on a lagoon consisting of 3X for two weeks, 2X for two weeks and thereafter the "1X" maintenance rate. We will forgo the application of a shock treatment and determine if the 1X rate is adequate.

The proposed protocol for applying EnviroLagoon includes addition to the system at intervals of every three days. This will provide a more systematic way of dosing the product. The product can be dosed in 20 gallon amounts every three days for a period of 30 days or 10 treatments. The three-day intervals should provide an indication of performance when reading the generation of gases. For example, if there are obvious peaks / valleys after introduction then it is clear EnviroLagoon is having an effect.

After the four week period of time pre- and post-digestion measurement can be taken and a decision made to continue as is or make a change. There should be no suspension of treatments in the interim of deciding.

Rick Vetanovetz

Centralized collection vessel where it is proposed to add EnviroLagoon to the system. This vessel is immediately before the anaerobic digester. Note the agitation of the manure slurry.

Specific EnviroLagoon® Additions and Actions by Date

Month	Day	Gallons	Notes
Before treatment	Sample manure from before digester and after. Analyze for BOD, solids and plant nutrients. Test solids for microbiology after separation		
June	2	20	Monitor gas output
June	5	20	Monitor gas output
June	8	20	Monitor gas output
June	11	20	Monitor gas output
June	14	20	Monitor gas output, evaluate dosage
June	17	20	Monitor gas output
June	20	20	Monitor gas output
June	23	20	Monitor gas output
June	26	20	Monitor gas output
June	29	20	Sample manure pre- & post-digestion, test for items at TIME 0, test separated solids for microbiology, evaluate dosage
July	2	20	Monitor gas output
July	5	20	Monitor gas output
July	8	20	Monitor gas output
July	11	20	Monitor gas output
July	14	20	Monitor gas output, evaluate dosage
July	17	20	Monitor gas output
July	20	20	Monitor gas output
July	23	20	Monitor gas output
July	26	20	Monitor gas output
July	29	20	Sample manure pre- & post-digestion, test for items at TIME 0, test separated solids for microbiology, evaluate dosage
August	1	20	Monitor gas output
August	4	20	Monitor gas output
August	7	20	Monitor gas output
August	10	20	Monitor gas output
August	13	20	Monitor gas output, evaluate dosage
August	16	20	Monitor gas output
August	19	20	Monitor gas output
August	22	20	Monitor gas output
August	25	20	Monitor gas output
August	28	20	Sample manure pre- & post-digestion, test for items at TIME 0, test separated solids for microbiology, evaluate dosage
September	1		Evaluate experiment

CONTINUATION OF TESTING ENVIROLAGOON® WITH A DAIRY EMPLOYING AN ANAEROBIC DIGESTION SYSTEM

RESEARCH CONDUCTED BY SOLUTIONS 4EARTH® IN COOPERATION WITH PROACTIVE SOLUTIONS USA

PAGEL'S PONDEROSA DAIRY, KEWAUNEE, WI

DECEMBER 2014

Background

Pagel's Ponderosa Dairy (PPD) is a progressive dairy that utilizes a DVO anaerobic digestion system to process manure before entering a series of lagoons prior to being applied to local agricultural crops. Manure collection employs a flush system in which manure (from animal areas) is pushed into a central canal and ultimately flushed into a centralized collection vessel that agitates and meters the manure slurry into the anaerobic digester.

The DVO anaerobic digester is a "plug flow", steady state system designed to produce methane gas (or "biogas") for energy needs. Unwanted gases such as hydrogen sulfide are filtered out using a series of bio-filters so the engine that burns the biogas doesn't corrode from the resulting sulfur dioxide.

Manure slurry enters the system and passes through a series of "cells" or chambers inside the unit, taking about 16 days to flow through the complete digester process. The first cell is the *acid chamber,* heated via a biogas-powered heat exchanger filled with water from the latter stages in the system to keep the slurry biologically active.

The digester is monitored for various gases including methane (CH_4), hydrogen sulfide (H_2S), carbon dioxide (CO_2) and oxygen (O_2), all measured after bio-filtration. Following digestion, the solids are separated from the liquid, flash dried, and used for bedding. The target moisture is 40 to 50% to reduce or eliminate mastitis issues, and this dairy has experienced no issues using solids for bedding when those solids are sufficiently dried.

Following digestion and solids removal, roughly 60% of the liquid is recycled and used to flush the manure in the flush lanes; the remaining 40% enters the lagoon system, a series of four (4) lagoons in which surface liquid in each is siphoned off and deposited in the next lagoon in the series. As post-digestion liquid traverses the series of lagoons, solids settle. The liquid in the fourth lagoon, with few solids, is applied to agricultural cropland. Reducing solids helps avoid clogging of manure application devices, and indeed, this

dairy's goal is "zero solids" – clean liquid at the end of the process to reduce or eliminate restrictions on application and thereby reducing the cost of application.

A trial using EnviroLagoon® was conducted in the spring and summer of 2014 to evaluate the effect of the product on the performance of the anaerobic digestion system, targeting four areas of potential benefit:

- Improved flow of manure into the anaerobic digester
- Reduced level of solids in the digester
- Reduced and higher quality solids post-digestion
- Increased methane production with decreased hydrogen sulfide production

This dairy was primarily interested in determining if EnviroLagoon enhanced the performance of the anaerobic digester. The digester is a significant contributor to the economics of the operation via the generation of energy, so any enhancement to the process improved the economics of producing energy. "Enhancement" could be either directly increasing energy production, or reducing maintenance and operational costs. Once the dairy's energy needs are met, any additional energy is sold back into the grid according the relationship established with the local energy company. The two maintenance and operational issues were hydrogen sulfide production and reducing solids in the digester. Learning from the initial study showed that this was possible using EnviroLagoon.

In the first study, EnviroLagoon was added to the manure collection tank immediately before the anaerobic digester. Twenty gallons of EnviroLagoon were added on Mondays and Thursdays from June 2 to September 29, 2014. Results and conclusions were reported in a separate document, but the results indicated that treatment of EnviroLagoon affects the system by:

- **Slightly improving methane generation and electricity output**. There was no negative impact on energy production, eliminating an initial concern.
- **Not increasing hydrogen sulfide generation,** eliminating a second possible concern.
- **Enhancing solids production.** The cause and extent of reduced solids was unclear; some original solids were cleaned out even as new solids were continually added. However, dairy observations and measurements seem to indicate that EnviroLagoon played a significant role.
- **Possibly reducing or eliminating struvite buildup.** Struvite (magnesium ammonium phosphate) builds up and creates obstructions in the system. The expectation was that the EnviroLagoon low pH would have a favorable impact despite a possible increase in solids introduction (e.g. larger herd).
- **Not negatively affecting solids quality.** This dairy continues to have high quality solids.

Evaluation of initial trial results seemed reasonably positive to all cooperators, including the dairy operators. The next thought was to more precisely control the EnviroLagoon treatments by adding the product at the point of manure entry into the digester to precisely control what went into the east half of the digester vs. the west half of the digester.

General Approach for Trial Two

The objective was to introduce EnviroLagoon at the point of entry into the digestion process (i.e. East vs. West acid chamber) to reduce variability by exactly proportioning product into each chamber, thus reducing possible unequal dosing. Additionally, by dosing EnviroLagoon right before digestion, it would isolate the activity of the product to the process. The rate of flow or "HRT" was unchanged. After entry, there is some oxygen present along with heating of the manure which supposedly helps biogas production process.

The digestion system was monitored before the introduction of EnviroLagoon to establish base-line data. Target commencement was Monday, December 22, 2014, although actual start date was December 15, 2014. The EnviroLagoon treatments occurred over the course of ten and a half (10.5) weeks for a total of 22 treatments.

Manure was sampled at four points before EnviroLagoon treatment, and every two weeks after EnviroLagoon treatment was begun:

1. Manure before entering the anaerobic system at the central collection vessel.
2. Manure slurry immediately after digester, and before solids removal
3. After solids removal – wet solids
4. After dryer – dry solids

The following parameters were measured by Midwest Analytical Laboratories in Lincoln, Nebraska:

- Moisture, solids, and volatile solids
- pH and salinity
- Plant nutrients before and after digestion (Total N, Phosphate P, K, Ca, Mg, Sulfate-S, Fe, Mn, Zn, Cu, B, Na, Cl)
- Aerobic and anaerobic plate count

The following factors were also monitored:

- Changes in digester performance
- Changes in solids generation and/or quality of solids
- Changes in manure flow through the system
- Changes in bio-filter or other equipment performance, e.g. solids removal, generators, or solids dryers.

The following were measured daily, specifically monitoring changes after introduction of EnviroLagoon:

- Changes in methane production
- Changes in hydrogen sulfide production
- Changes in power output

The recommended application rate, 40 gallons per week, considered the maintenance rate of 1X. In the first study, EnviroLagoon was added to the central manure collection vessel. However, in the second study, the protocol for applying EnviroLagoon called for 10 gallons every three days added directly to the east and west chamber for a period of three weeks, a total of nine treatments for each half of the digester process. **From a practical standpoint, the dosing can continue to be thought of 20 gallons on Mondays and 20 gallons on Thursdays.**

Centralized collection vessel where EnviroLagoon was added during the first trial. The vessel is before the anaerobic digester. Note the agitation of the manure slurry.

The arrows show EnviroLagoon points of entry for the for the second trial, right before the digester. There are two digestion cells. These pipes are right before each "acid chamber"

Specific EnviroLagoon Additions and Actions by Date

Month	Day	Gallons	Total Gallons	Notes
Before treatment	Sample manure from before digester and after. Analyze for solids and plant nutrients. Have solids tested for microbiology after separation			
December	15	20	20	Start. Assure manure samples are taken
December	18	20	40	Monitor gas output
December	22	20	60	Monitor gas output. Added 10 gallons to each half of digester for total of 20 gallons
December	25	20	80	Monitor gas output
December	29	20	100	Monitor gas output
January	1	20	120	Monitor gas output; take manure samples
January	5	20	140	Monitor gas output
January	8	20	160	Monitor gas output
January	12	20	180	Monitor gas output
January	15	20	200	Monitor gas output; take manure samples
January	19	20	220	Monitor gas output
January	22	20	240	Monitor gas output
January	26	20	260	Monitor gas output
January	29	20	280	Monitor gas output; take manure samples
February	2	20	300	Monitor gas output. **Projected last treatment.**
February	5	20	320	Monitor gas output. Choose where to put the remaining EnviroLagoon
February	9	20	340	Monitor gas output
February	12	20	360	Monitor gas output; take manure samples
February	16	20	380	Monitor gas output
February	19	20	400	Monitor gas output
February	23	20	420	Monitor gas output
February	26	20	440	**Monitor gas output; take final manure samples**
Gather all data, summarize and report back to Pagel's Ponderosa Dairy and Pro-Active Solutions				

Results and Discussion

Gas Production and Energy Output

The mean daily gas production during the treatment stage (December 21 - March 3) was compared to the mean daily gas production during the pre-treatment period (December 15 - December 20). EnviroLagoon had a measurable effect on gas production, increasing methane and decreasing hydrogen sulfide. There was a decrease in energy output which is not understood since methane increased. Based on this, we can conclude the following:

1. **Methane** (CH_4) increased with the EnviroLagoon treatment, particularly noticeable in early February through the conclusion of the trial. The mean daily CH_4 reading pre-treatment was 54.8 compared to 55.6 during treatment, a 1.4% increase.
2. **Hydrogen Sulfide** (H_2S) decreased with the EnviroLagoon treatment. While H_2S is measured post-filtration, we assume that the filtration process efficiency improved during the treatment phase. The mean daily H_2S reading pretreatment was 2152 compared to 1821 during the treatment, a 15.4% decrease.
3. **Gas production** (KW) was negatively affected, with the mean daily KW pretreatment at 1151 compared to 1030 during treatment, a decrease of 10.5%. As stated, we would have expected higher methane production along with lowered hydrogen sulfide levels to result in a net increase in energy, so this decline remains unexplained at this date.

Manure Solids

Most manure chemistry numerical changes, calculated based on solids weight, reflect changes in moisture content. Biological changes (aerobes to anaerobes ratio) resulted from the environment and solids weight. Anaerobes increased going through digester, but this was reversed after drying and air was allowed to infiltrate solids. The pH also increased as it went through the process. Other observations:

1. **Ammonium** increased slightly immediately after digestion with approximately the same moisture percentage.
2. **Ammonium, Organic N and Total N** increased in dry manure as a function of less moisture and more solids.
3. **All elemental contents** increased in dry manure as a function of less moisture and more solids.

4. **Manure pH** increased as a function of digestion and less moisture.
5. **Sulfate sulfur** is decreased by digestion.
6. **Aerobic/Anaerobic ratio** decreased slightly immediately after digestion but increased with drying.

Observations by Participants

Several observations were made by the manager of the digester operation:

1. **Gas/Power.** Manager knows that they have been generating more gas. He said not only have they never had levels sustain as they have over the last few months, it has been very consistent. He attributes it to the EnviroLagoon clearing out solids in the digester. Even though they still push too much manure through it, he feels there is better digestion as evidenced by the reduced solids.
2. **Hydrogen Sulfide.** Levels have stayed consistently around 1700 to 900 ppm. When asked about the iron oxide filtration chips, the Manager commented that they just changed them – and the old ones were run longer than normal. Despite the age of the chips, H_2S levels were staying pretty consistent indicating an increase in chip longevity. He felt that the EnviroLagoon has had an effect on H_2S resulting in the chips lasting longer and working better.
3. **Solids.** The Manager commented that they recovered more solids than ever, a continuation of the benefit they saw during the initial summer trial. He said when he added EnviroLagoon directly to the acid chamber, he could see the reaction and the solids coming up. We discussed solids reduction and benefits for the digester, manure handling, bedding volume, etc. and he agrees that the product definitely has a positive effect.
4. **Struvite.** The dairy is scheduled to run a "jetter" through the lines and he will report back. He said if lines are clean – he knows it would be a direct result of EnviroLagoon additions.