Forced Aeration with Preprocessing Mortality Comp.

Welcome to today's webinar entitled Forced Aeration with Preprocessing Mortality Composting Systems . My name is Jen Ryan. I am a natural resources specialist for the natural resources conservation specialist East national technology SportsCenter and I will be your host.

I would like to introduce our moderator, Bill Zacharias. Bill has assisted various offices in a variety of conservation engineering projects since 1991. He has worked at the East national technology support center on the national animal manure and nutrient management team since October 2019.

Also joining us today is William Reck. Before coming to national headquarters in 2014, Bill spent the previous 10 years as an environmental engineer and he was the liaison to the Army Corps of engineers working on Everglades restoration in Florida. Bill, welcome. You may now begin.

Thank you. welcome everyone to a conservation innovation grant success story. We have a presentation from a recipient advanced composting technology. They have put together a video for us with clips from former staff, University extension and extension professor for the main school North Carolina state that as well as ACT staffs themselves. I have known the folks at ACT for over 10 years and was involved and visited some of their forced air composting sides. Those were quite a bit different. They have continued to innovate since that time. Today they are going to show us and discuss some of their latest innovations in composting with forest air. One thing I want to cover before we move any further, and RCS does not endorse any vendor or technology in particular. The following video is provided courtesy of advanced composting technologies. With that I am going to turn it over to the president of ACT, Keith Warren. Thank you, Keith. I appreciate you putting this together for us.

Bill, thank you. we are excited to share the story of the composting technology we have been developing with the natural resource conservation service for almost 20 years. Which shows a video platform because we wanted to give you a sense of being on the farm, of learning and watching the process play out but most importantly so you wouldn't have to suffer through listening to me for 40 minutes. I will turn it back over to Jennifer for any last minute instructions and we can get started.

We are good to go. I will go ahead and get the video loaded.

As farming and agriculture have advanced over the past 40 years technology and efficiency have been at the forefront in many areas. However, in the field of animal agriculture, mortality management has presented a unique set of challenges costing farmers time and resources and creating headaches and unforeseen problems. In 1998 on a small dairy farm in Asheville, North Carolina, a few people started toying with the idea of new technology for traditional composting that would forge a new path in the mortality system. Today we are going to look at this new technology built on the composting science and principles of yesterday with a process engineering and innovation of today.

In 1998 advanced composting started on a dairy farm in Asheville, North Carolina composting dairy manure and sawdust. We did it the old-fashioned way. We did steady pile composting. The to front end loader and kept turning that over and over and over again to try to keep the air going and try to get the process finished. It to 16 weeks to make our first batch of compost. In those 16 weeks we kept saying there has got to be a better way of composting that we don't have to keep turning. We started looking at technologies that were available anywhere in the world. We found forest air technology was being used in Europe and we said that makes a lot of sense. We started developing the technology on a dairy farm and in a year and a half or two years in about 2000 we were producing 1000 cubic yards of compost using aeration every month. NRCS heard about our technology and we heard about Wilkesboro having a lot of poultry. We needed additional nitrogen for our composting facility and I contacted NRCS in Wilkesboro and met Ronnie Howard who had been with them for 30 something years at the time and he said if you will bring what you know about composting to Wilkesboro and educate us on how the process works we will get you all of the chicken litter you will ever need.

1980 I had the privilege of moving to Wilkes County with NRCS. At that time Wilkes County was the number one broiler producing County and North Carolina. I hate to be negative but the farm community

were building these composters out of poor material and poor construction. There were problems, there were fly problems. You name it, a lot of things going on with static being -- with static been composting. We were challenge to look at that to say what can we do as a federal agency to improve on the static been composting that was being done? We start building litter sheds. We built static been composters off to the side sometimes inside. These were a step in the right direction but the truth of the matter is, the integrator did not know how to help growers with composting and in reality I didn't know enough about composting to help them the way I should have been helping them as well. Around 2000, the rotary drum hit the marketplace. The rotary drum seemed like something that would work. We bought a couple out of Mississippi and Farm Bureau bought when. These things failed miserably. Why did they fail? We didn't know the science behind composting. They lacked air and air is unimportant he's. We struggled and struggled and worked our way along with the rotary drum that ironically, about the same time we started looking into rotary drums, I get a call from this fellow by the name of Keith Warren with Mountain organic materials. He said he needed a nitrogen source to go with his forced air rated composting system that he was using dairy manure and sawdust to create composts to sell the landscape market up there. I said I will tell you what. You have got my attention. Forced air composting, I have never heard of it. I need to know more about it but I also need help in understanding composting rotary drums. If you will come down here and help us with rotary drums I will try to help you get litter to make more compost for your market. Keith came down. We were on the farm. We looked at the rotary drum. He said it is going to be anaerobic. It is going to go anaerobic every time. He was right. Air is again such an important part of the composting process. In 2000, 2001 we got a CIG grant, conservation the innovative grant. Using Keith understood the science. I want to stop and save this quickly. The science is so simple once you understand it. Microbes do the work in composting. They are like us. They need air, water, proper diet and the ride home. It works and it works well. We took Keith's concept we wound up with material yields that where 140-160 degrees free of pathogen. We captured the leach egg because it was a major concern in this static portal we needed to be in. It was a critical element. In 2003 we went forward with first permanent engineering design structure and one of our farms. Equipped funding was a critical part and it was a critical part during fall. We struggled along and away. We did a lot of good, a lot of improvements were made but we were still having issues capturing and returning leach egg. We will not get into that but we had problems. We have problems with --. We needed to keep innovating and coming up with a better system. A good system, a great system. Far better than static. We were still lacking. In 2015 we started looking at preprocessing. We can't say enough about the preprocessing step. It is proven change composting for us, forever. They seem to love it. They get to do all of the work out of the seat of a tractor. We were able to bird use of the building fewer bins, higher loading rates, shorter cycle times capturing all of the leach aid. Bones not a problem. Every resource concern we have were read about for almost 15 years we were able to solve with preprocessing steps. I want to say this in the end. And RCS private sector we came together. It was a collaborative effort that just flat out gave the farm community would they need to be able to handle the mortality that is generated on the farm.

Since then we have designed almost 400 systems in the state of North Carolina with forced air or forced air with preprocessing. We made a bunch of mistakes on how we I accomplish the leachate control and how we do aeration. Today what you have seen is the culmination of those 20 years of development.

Static composting is what most people think of when they think of compost. Various materials are mixed together in layers and managed to prevent leakage odors on a variety of other unpleasant side effects. In the world of animal mortality composting the challenging of disposing of a large number of large animals presents an even bigger challenge. To understand this new technology let's take a minute to understand the traditional process of composting.

Hello. I am an extension professor and director of the main compost research and education center here. Today we are going to talk about the basis of composting out what it means for the different types of systems you may be running. There are really four major components of composting you need to think about when you start composting. Moisture, particle size aeration. Without understanding the basics of composting it doesn't matter the type of system you will be running. You will have management issues. Understanding these of these components is at important. You need to have an appropriate amount of moisture for those microbes to work in the biological system of composting. The needs to be between 40%-60%. It is really easy for you to test in the field by just taking a handful of composting and squeezing that in your hand. If the moisture content is too dry that material actually will fall apart in your hand and if the moisture content is too wet when you squeeze it you will have this ringing water come between your fingers and went out of your hand. When it is just right, it will stay compacted. I like to say it looks like a good to of tobacco you may have. It is kind of sticky. It clumps together. It doesn't fall apart but yet it doesn't rain water. Moisture is

important for the microbes it leaches into the carbon nitrogen ratio. It is for the food for the microorganisms. This needs to be somewhere between 25-30-one A5-40-1 is about where you want when you start. Depending on the system will depend on where that range wants to be. This is the products or the food source that the microbes need in order to work. They need more carbon and ratio to the nitrogen. If you have too much carbon they get starved for nitrogen and they can't make the protein staining. They have too much nitrogen they don't have enough energy in order to function. It is the balance you really want. They need air and we call this ferocity. The way in which you develop is by having good structure we want to be able to have at least 5-10% oxygen inside the compost piles.

The reason for that is to create the porosity. One of the things we are starting to work on as far as porosity and particle size is it allows you to reduce the particles but also allows you to really mix particles and to actually incorporate moisture prior to the composting process. Tug grinders, horizontal grinders, this is particularly in relationship to large poultry composting. We want to reduce the particle size of those animals so that we have more surface areas for those microbes to work and we can actually blend the moisture prior to going into a compost pile.

A forced aeration composting system with preprocessing takes the fundamentals of composting to the next level by preprocessing the material on the front end and introducing air throughout the composting process. We have been building composting systems with the natural resource conservation service since 2003. Technology has been approved by a national level. I don't know that we have the capabilities but we have the opportunity now to build composting systems -- 5%-10% oxygen inside of those composting piles. -- The wet from the mortality gives us our water and our diet is ready. We get the nitrogen piece we are starting to compost in the machine. He has been composting for about two weeks. We are about 140 degrees inside of the mixture. On a daily basis he is going to turn on one minute as he dumps his buckets of little babies in. At the end of the flock he has got a tractor bucket load in 2000 pounds to deal with, he is going to do a mixer and a half load because he is going to dump the mortality in. Is going to dump the carbon in. He is going to spit it out move it over to the aerated section for composting. That is where the composting process starts. We are getting the diet on the water right over here. It looks like a wet mulch coming out once we have processed. You can look at some of these pictures. This is actually sows coming out after 20 minutes of processing. There were five big girls in there. You don't see a lot. There is not a lot of bone you can see. There is no fleshy part. It looks like wet mulch. All we have to do now is compost. It hasn't killed the pathogen. That is what we are really here for. Let's kill the pathogen. Let's get rid of the rest of the particle sizes that we can't really see but they are still there. 11-17 days on the large animals, 11 days on chickens. It is really ready to go to the field. Reduce the particle size. The bones are basically gone. The pathogen kills happen meaning the temperature and days requirement has happen. We are still going to move it to curing in the second stage. All of the composting is done because we do so much in them preprocessing side. I would like to show what our product is. We put a cap later. It comes out of the machine basically into a wet mulch. After composting we have killed all of the pathogens. It was about 150 degrees for over 10 days. There is nothing really gross there. It smells like a roasted grain which good composting should always smell like a roasted material. There is ammonia and methane which stinks. It smells sour. With oxygen and high temperatures you are resting for multiple days. You are slow roasting the heck out of whatever is in there. It is a beautiful product coming out. He has about another 2-3 weeks to get to his first batch load to move this back over into his curing area or second staging area. Then he will put a filter on the floor that protects the pipes. His air maintenance is down to zero with preprocessing there is no black liquid coming out. Nothing gets into the pipe. The pipe is always pressurized once it is loaded. There are little compressors and they are putting all of the air we need. Was spread of the air throughout low pressure high-volume. The high-volume allows for little bitty chimneys to take fresh oxygen into the pile. The microbes creating the heat and thermodynamics tells us hot air rises, right? Our facilities will load 60-70 feet. They will put eight mixer loads you are re-putting the first stage because you want to inoculate that batch. The very last thing on that list is after the thousand pounds of sawdust and a 1500 pounds of mortality taking up to 2500 pounds we are then going to add a 500 pounds of finish compost. Mainly because the CNN ratio is right and the food is right but there are some bugs in there ready for some fresh meat. May get them spread out homogenous Lee and then those microbes can go to work. They are not going to work tomorrow. They are going to work today. The food is available. They get busy. We will be at temperatures above 150 degrees on day one. Day two we are going to be above 165 and we will hold that through the first stage. About the last day is 11 days. Those temperatures will start to walk down. There is not anything left for them to eat. They get in there and get busy and it everything quickly because they have access to it. There is not bones. There is not leach aid. It is an easy system to use. Would help reduce the footprint of the building by speeding up the cycle time.

Help pay for the technology. Technology is a little more expensive than the wooden building that the reduced labor and the reduce in carbon really pays for the facility long term.
The structure has the forced air and the preprocessing which is behind me. We used to build concrete bends. Since we started preprocessing together with USDA and RCS is our North Carolina Department of ag, we started looking at why do we need been walls and doors.

A natural extension with preprocessing technology is the open floor facility design. This cost effective alternative to the traditional facility takes advantage of the preprocessing step where the whole animal carcass is grounded and mixed as demonstrated earlier. With little or no discernible caucus material left after preprocessing, been walls are no longer needed. What is needed is a been wall designated on the wall, a simple redline painted on the wooden been wall across the floor. As you can see in the video, not having design -- divider walls is not a problem. On 11 inch chain wall is built around the perimeter of the facility to contain any leach aid or rainwater that may blow in. To act like a push wall for moving material in and out of the different areas. This concept has proved to be more cost effective to build and is easier to navigate for the operator. The standard vertical feed mixer was designed to make speed, not chop and makes mortality. We had to make several changes. Like a different tub designed to create pressure points where we could then add cutting knives to the sidewalls. We had to beef up the gears and we added a stainless steel liner to the inside of the tub. We added a variable frequency drive to accommodate a single phase electrical supply and provide a soft start to a single three-phase drive motor. We also had to slow it down so we could get the torque we needed and we needed to make it reversible so we could remove any non-grind double in the process. Then we had to design a standalone conveyor.

By working with NRCS and other agencies, ACT was developing the technology to address issues on many fronts across the state . Creating new technology is not without its own set of technologies. The collaboration helped pave the way for the systems to be introduced.

Concerned going into it is the fact that you are doing with it new technology that there are current ways we set on up upon how work It is may not be necessarily current enough to meet up with these new technologies. You develop any technology how does that affect your temperature? How does that affect your time? How does that affect your compost? Really that is not necessarily as a --. Then, you have to figure out what data do you need in order to prove the compost is working effectively and have something that is rolling out to all levels the national level, the state level, the industry. They have all been kind of working in the same way and that becomes a very tricky area because we have regulations and guidelines that dictate sometimes this parameter, this parameter, this parameter. Those parameters no longer are the things we should be looking out. That is what becomes the greatest challenges moving forward with any technology.
Now, these strategic collaborations are shining a light on effective new ways to deal with the challenges that growers face. Data from research and testing has allowed regulatory agencies and farmers to redefine what types of technology may be the best fit for application on a broader scale and new ways to operate in the future.

For me going back and looking at this technology it was something that was introduced to us a while back. I think there was a lot of promise to it where we were looking at this as a benefit and facilitating the process and theoretically on paper and hypothetically all of the things he would accept. It really became an idea a let's just set something up and get some pilot data. Then it became more of a collaboration effort. Once we ended up getting to the points we were able to see that data, take it that and have all of this information being shared back and forth it became an easy process. For us at the state level we move forward with permitting and hopefully permitting a better product.

Static been takes more time because you are dealing with whole animals. You are taking the whole animal and covering it with mix and covering and loading. That way you get your air moving around them and they start to break down. That has to work from the outside of the animal in. Way get it all the way inside of the animal and inside of the boat because we crack the bones. Now, it can get all the weight some marrow on day one instead of three weeks down the road. Our footprint can come down because our number of days to compost is a lot less, right? If this was static bins, this facility would be about two times longer for poultry. If it was for finish hogs or for turkeys, this facility would be about four times longer. That reduction in footprint helps pay for the technology, the air piece and the preprocessing. Your labeled reduction of having to cover and then move the product multiple times you have a time you have to move that product for static bins. Here you are mixing it and that is your first and second stage. Your third stage is basically sitting here

on top of air. There is no movement. You move product to break down the bone and the material and get it mixed. Would do that mechanically. The other reason the compost is to kill pathogen. To put air to it and those microbes go to work. That reduction in time is reducing also your labor. It is reducing the amount of carbon you have to use. You can also use different types of carbon. Carbon sources that are free. Old hay bales that can't be fed to cows work great for microbes. You don't use them in normal composting because you can't chop up that wax coating. If you can chop the wax coating you can get the carbon out of the glass. Down in the southeastern part of the state where there is a lot of peanuts we will use peanut holes. There are other alternative carbon sources that work great but you have to have carbon and composting. Otherwise you are just using litter which is nitrogen and then you are pickling. Pickling is just making a mommy and waiting until you take it out to the field and Amami hydrates and the buzzards are happy. We don't want to make buzzards happy anymore.

I felt like it was a challenge and a messy challenge on top of that not from just me but the process it was really hard on my equipment at times but also we can take a lot of care and time and people don't want to hear it but we have to put it down where it is true, I don't know how deep we would static compost and bear these mortalities they would work it out work it out work it out and then they were having a feast. I could put it three feet deep and four feet deep. That is another issue we have done away with. They are not coming over to this facility now causing any issues or damage and with them bringing in disease issues. We are not only dealing with getting rid of that problem but we are also moving into animal welfare issue.
Understand I am not in any way shape or form a composting expert. I do not claim to be. I am not a subject matter on the issue. I have not gone through special training for it. With the basic concepts of composting you like to have them with a product you are working with. The more uniform your compost is, the more likely you will have some efficacies. When you are dealing with large animal carcasses is more challenging in order to be able to have a successful compost in my opinion. Back to me was that easy Novice side of the things. Let's try to make this more uniform going into the system so that way we hopefully get through the process more efficiently.

Even as the systems have been implemented across the country, partners have continued to find new and effective ways of utilizing the technology from everyday farm applications to disaster and flood relief. Not only has the equipment been useful in action but the expertise provided in managing the process, building new disposal strategies and planning for unforeseen problems has been a helpful addition to the tools available for today's farmers.

I think it is really important for people to see it in action. When you hear about a grinder or preprocessing it really may not mean a lot to you as a farmer especially since it is a newer technology. When you have the opportunity to go out and visit a site that is already working with ACT's grinder or any type of preprocessing as being able to have a good easier and better process is a huge help to them. We love to learn by doing and being able to have that available for producers to see how it works is a huge opportunity for them to better manage their mortality on their farm if they so choose to go in that direction.
From North Carolina's standpoint it really was a matter of assessing what needs are in the ground, looking at the technology, going through the data and once we go through the data and the collaborative effort realizing this was a benefit to our producers to have these units and met all of our state guidelines that we had put forward that we felt comfortable with moving forward as far as permitting and providing at least as good if not probably a better way of composting material.

I have said many times I wanted to be able to end my career with NRCS and maybe with ACT as well being able to look farmers straight in the eye and say this is a system that will work if you address every concern you have ever worried about. Preprocessing and forest aeration is a game changer. It is a game and it has changed composting forever. It is a solution that works.

One of the points I would like to make about advanced composting technologies is that when we started building composting systems in 2003 we have done nothing but build mortality composting systems for NRCS ever since then. The focus of our business has been animal mortality composting. Because we have been focused just on how you deal with animal mortality, we have learned a lot and have been able to innovate a lot because it is all we do. Advanced composting technologies has worked for the last 20 years for North Carolina's natural resource conservation service to develop the technology we share with you today. We are excited about the technology being approved at a national level and we are excited about what the next 20 years looks like. [Silence]

Thank you. Bill, if you are ready to take question and answers, we will take answers first bed questions if you are ready to take those, we are ready.

Yes, this is Bill. I am ready.

We have a question or comment. Carl has asked in addition to volume reduction what usable composting products are created for the benefit of agriculture? Bill? Bill Reck, would you like to take this one?
Sure! Composting, there is a couple of things. One of the primary things it does is it stabilizes the nutrients. Once you have composted you kill pathogens and you stabilize the material and you reduced volume. Those things are useful to agriculture to the standpoint of less volume that you have to take to the field to spread in the nutrients are in a stable form. That is a part of the reason we do it from an animal mortality standpoint. It is a lot about pathogen kill and a good method of disposal of the carcasses in a manner that doesn't affect water quality. We would like to see people move away from burial which can pose a water quality risk and moved toward composting methods or another method that doesn't interject a problem with quality.
I would just add to that, the two things we did with preprocessing was to address the bones so that material could be more readily land applied when done with the composting process. Secondly, because of the aeration and higher temperatures, we are doing pathogen kill instead of pathogen reduction. People can feel safer about land applying it and it is in a condition with bones being reduced that it can be applied to the field and then planted on top of.

That is great. I also remember from the presentation about the wonderful benefit of less flies, order reduction in less leachate.

Going on to another question, how hard is it to find contractors to install the slotted floor? Keith, do you want to take that?

I will take that. As a turnkey provider with the service, a part of what we do is build the systems on farm. It does take a lot of expertise to poor floors in place with slotted floors but that is a product that we provide. We do the construction of the system. It takes a lot to poor floors in place where you either saw them in place.

What are the four items required for successful composting? Moisture, CN ratio and the other two are? Bill, do you want to take that?

Sure. The obvious one would be aeration and I'm not sure what the other -- article size?

Yes. That is closely tied with aeration.

Carbon, nitrogen, moisture and aeration.

The fourth item would probably be the inoculating culture. In your recipe you have got to have some finish compost to start and then you make the other arrangements with the sawdust and of course with dead animals.

Okay next we have a question.

I will handle that one. The way it works in NRCS, each state determines what practices and to what extent they are going to provide assistance in each state. The way we handle that and come up with the financial incentives is we come up with what we call typical practice installation scenarios. We would cost out that scenario and apply a percentage so that. It would be the percentage that we would provide as an incentive to install the practice. That percentage can vary based on eligibility and whether or not you are in a special category like limited resource farmers. The bottom line is, what is offered in North Carolina can be different from what is offered in South Carolina. It really can vary from state to state. That is a function of what the folks -- the industry folks are working with, the state conservationists in each state to give some input on what their priorities are and then this date with the tech documenting will determine what is offered in that state. I really don't know what is offered specifically in South Carolina. I do know South Carolina has animal mortality facilities but I don't know exactly what their current scenarios look like. I will say at the national level we create some scenarios that we try to make some generic scenarios to cover some different situations.

We provide those and states can take those and use those as they are or they can modify them to better fit their state. Again, this year, we created some scenarios for fiscal year 22 and we are still in fiscal year 21 for South Carolina. Like I said, with 50 states I can't keep track of what each scenario looks like in each state. Even if I am the reviewer for those scenarios there are just too many for me to remember.

I have been working with South Carolina and Stephen Henry does believe in 22 that they are providing equipped funding for forced air with preprocessing.

Okay. Thank you Chandler of A.C.T. The next question is for you all also. How much weight of mortality can the preprocessing handled per week?

It is not so much the preprocessing material. That equipment can handle between 1500 pounds and 3000 pounds depending on the size of the machine. It can handle that once an hour. If you have got 10,000 pounds in one day you can run five batches of material there either one of the machines. The preprocessing equipment can handle -- It is the composting facility on the other side of preprocessing that has to be sized for the amount of mortality. The preprocessing units are based on the size of mortality that we are preprocessing. Would use a bigger machine but there is plenty of capacity on the preprocessing unit to handle an incredible amount of mortality. The challenge will be to have a composting facility that can handle that much mortality.

Yes. Let's say Keith at the facility has something happened to where they have a mass mortality events. Talk a minute about what you think -- how your facility could handle or be impacted by such a scenario.
There is capacity built into our composting systems to handle more mortality than what the average is. Wayne out at the end of flocks and stuff we are never going to have -- we are never going to be operating in dealing with just the average. We build in additional capacity to our composting systems. We know second stage materials could be moved into that and first stage materials could be moving quicker to make way for processing mentality if you have a big spike of mortality. Guests, we can fill up everything in the facility. There comes a point where mass mortality just overwhelms a composting facility but the composting facilities to have a significant amount of excess capacity built in.

I would think that in an emergency situation if you filled up your aerated Benz you can still preprocess and create outside of your facility and compost and a static wind row. You just wouldn't be -- it just wouldn't compost as quickly as the forest aeration. That would be something in an emergency situation.
Absolutely! That is an option I hadn't even thought about. Going outside of the existing facility are going with material into another facility. Those are all options when looking at a mass mortality events.
Okay. We have another question if we want to move on to this one. What methods or media do you use to inform farmers? Keith?

I will that Chandler who was over our sales take over that question.

We personally train individually each Grover that gets the system. It is a part of a turnkey facility. We design based on the carbon that they have available to them which is going to be the best price to them. That is what we designed the recipe to. We changed that scale up to show what they are using so that we get the moisture content and get that right with each individual as well as we have YouTube videos available to all of our clients and just on our website as operation and maintenance videos as well as start of videos. We have a lot of information readily available to clients.

Next question, is there a certain -- operation that makes -- compost cost-effective?

Is there a certain size? Yeah.

What would that size be roughly?

You are talking about six operation on poultry and probably of 4800 finishing operation. 300 or 400 pounds of mortality per day. It is where you start to see some efficiency.

That was for swine and for poultry it was what?

About 250-300 pounds per day as well. That is average daily mortality.

Okay. Thank you. 4 the really large facilities is where we truly tart start to shine because all of the efficiency of the technology starts to share.

Did you get that, Bill? Basically as the facility -- as the size of the farms get bigger, the efficiency of the composting system really starts to shine.

The next question, are there any farms that install posting system several years back without the grinder mixer considering adding this feature to their composting system?

Yes. There are several farms that we just added forced air that came up to provide out of their own pocket to move forward. They had the air but they added the grinder mixer later. The answer is yes.

Okay. Great. The next person was wondering about transference of drugs. Are drugs completely degraded? Has research been done with this particular system?

Our composting system would be no different than any composting technology that is composting mortality. We are all going to deal with drugs in the same way. If there is a particular drug we can look at and address, let me let Chandler address that may be.

The University of Maine has done research on that and they have published information that if you just go to the University of Maine composting site, they have that information readily available. It is a basic the dilution is the solution.

Okay. Thank you. the next question or comment, ACT does all the system installs nationwide after the building is filled by a local contractor. That is a question.

No. ACT is responsible for the engineering of the building, the building, the construction of the building, the installation of our equipment, the training of the growers, making sure our systems are approved by the permitting agency in the state obviously before we start construction. As a turnkey provider we do everything from the engineering on the front and to construction to engineering permitting, start up training, warranty and service.

Okay. Another question, at what point keys, at what point in the process is old compost added for inoculation?

We want to add materials wall we are preprocessing. We would add 1500 pounds of carbon into the mixer. We will add mortality into the mixer. After we have reached the 2500 pounds or the set rate for that size mixer then we will add compost to inoculate the process before we put that on there.
Finished is aware. Finished compost.

Actually we want some hot compost. Want some that are still rocking and rolling.

Okay. Thank you for that distinction. Is the final product exceptional quality compost -- Keith, do you want to take that?

That is a very subjective opinion on our part. With think it is very good compost. Can it be land applied? Is it a good nutrient for farms that can land? Absolutely! Is it a product of a exceptional value that you can sale or -- I don't have an answer to that. We have never advocated stealing animal mortality composting.
Let me ask Bill if I may, is the final product exceptional quality compost? Exceptional holiday compost sounds like the state term used for composting. I am not sure about that specifically. Usually you don't sell mortality compost because some states don't allow that. I know back when I was working on the systems you didn't do that because you would have bone fragments and pieces in there that you wouldn't want to sell from a quality standpoint. May have marketing issues for people they know what the source of the compost was but certainly it would depend on Department of Agriculture in their state and what their roles would be.

Thank you. Deanna has another good question.

Was started with University and started doing their foodways. The first was pre-and post consumer food waste. Yes we have. Henderson County in North Carolina where the national funding.

Thank you. links would have a question. After you have material that has been through preprocessing and takes less time to move from first stage to second stage to storage if you take the material through preprocessing and you don't have the air you are doubling the cycle times to get through first stage and second stage in your you losing a lot of the advantage. It is slower to run preprocessing materials without using forced air. It is somewhere between a 35% to 50% loss in performance.

Okay. Moving onto the next question. Carl asked about any thoughts about composting cooperatives to take mortality and waste to essential facility for the smaller operations.

What we are concerned about security along the farms. If it does on the farm It is to stay on the farm. Our way of thinking is based on whatever dies on that farm need to find a way to deal with mortality on that farm so we are bio secure. That is a huge concern of animal agriculture today.

This is Bill Reck. Let me add on that a little bit . The current model we have for rendering it where you would put the animals into the freezer and you would have the truck come pick up the animals from the freezer. The freezer is on the edge of the property. I suppose you probably could do something similar to that instead of taking to a renderer. Now you are taking to a compost facility. Keith is right. The biggest concern is the bio security concern. You would have to crack that method to make it work.

Another question. Did the design for Leach aid collection change?

That is one of the great things about preprocessing deals. We struggled with how to make them work. When we went to preprocessing animal mortality that piece went away. There was no more leachate. We were forcing the carbons we were using in the mixer grinder to do what it should be doing. That is absorbing the lick that are in the carcasses. The great and ranted to preprocessing as all of the liquids inside of the carcasses we now get to force that into the carbons and in the mixer. There is no need for leachate collection recirculation and return. Thank goodness that is the case.

Right off the bat. That is right. It is pretty much taken care of as the presentation showed. It looks like that may be it for questions. Was still have about 20 minutes but we don't have to use it, I don't think. Jen, I may ask you or if any of the other presenters have any other final comments.

We would love other than that -- I would ask one question if the state wants to move forward in their group or their state has not been signed up is that window closed as of today? Would you speak to that?

From an and RCS standpoint, our annual cycle is you start hitting together scenarios in the spring of the year and they will go into early summer with states going in and making changes. After that would do some finalizing things with a goal of publishing each states list at the beginning of October. Some years we have had some things that pop up from a problematic standpoint. Right now states are getting training on how to publish those final rates this week and I would expect they would be publishing those in the next week or two. The opportunity for states to modify the only way they could add it would be to add one of the national scenarios. We will start working on next year cycle next month. In terms of sizing these facilities our folks need to be able to have a conversation. If we were going to size something like this so Keith and I put together a spreadsheet that you can use based on pounds of mortality from your operation. Get an idea of the facility you would need with forest air and preprocessing. That is in the handout. We gave that to states because they would need that if they are going to use those national scenarios. I will say they're ours dates that have their own scenarios that you can -- that they can contract already. There are states that are out there that have gotten by the pound type of scenarios that are out there that they use regardless of the technology. There are options out there and in a lot of states even if the scenario doesn't say forest air composting where you can still use it for that. Did that answer the question, Keith?

Yes. Thank you. that is all I have.

Okay. Thank you.

I remember those systems and I am glad we moved on from that. Those systems are good because they took care of our problems. Current innovation I think is better.

Absolutely!

Okay Bill. Do you have any final thoughts before we close out the webinar?

I just want to say thanks to Keith and his crew at advanced composting technologies. I have been talking to Keith for a couple of years about us trying to do a webinar together. We managed to get it done this year. Keith did all of the work really. The videos they completely put that together themselves and I think that was a wonderful job. We got discussion from a land owner. We got to see some great clips from extensions and other experts. I just want to say thank you, keep. That was a job well done. I think it is a very informative video and highlighted your technology very well. Thank you.

Just a reminder. There are several handouts and several links available in the today's handouts in the today's links boxes. Participants make sure you check this out. If you have further questions about this technology please reach out to advanced composting technology to Keith and his crew and they will be able to answer your questions. On behalf of the USDA and the natural resources conservation services I want to say thank you to Bill Reck, Keith Warren and Bill Zacharias for providing an excellent presentation about forest aeration with preprocessing mortality composting systems under practice standards 316. Thank you again to everyone for attending today's webinar.