Good afternoon. Welcome to today's webinar entitled bale grazing, an alternative strategy for overwintering beef cattle. My name is Jen Ryan and I'm a natural resource specialist for the national resources conservation services national technology support Center and I will be your host.

I want to take a moment to remind participants the use of trade names during any of our webinars is for information purposes only. Mention of trade names does not constitute guarantee of a product by the U. S. Department of Agriculture doesn't imply endorsement by the department or the natural resources conservation service over a comparable product that are not named.

With that we will begin

I am pleased to now turn the webinar over to J.B. Daniel. J.B. is the State Grazing Specialist and Grassland Agronomist for NRCS in Virginia. Over the last 12 years he has worked to develop quality training opportunities to maintain a knowledgeable and highly-competent conservation field staff. He actively partners with local, regional, and state specialists and organizations to conduct pasture walks, grazing schools and practical field demonstrations to transfer knowledge of sound principles and management techniques to producers and conservation staff for the improvements to pasture and grazing management and soil health.

Thank you Jennifer. It is great to be with everybody today. To begin today's session I'm going to introduce Dr. Greg Howlett, he is an economist at the University of Kentucky where he works with farmers to improve the profitability on livestock farms. Production focus areas he works on our biological farming tech geeks that reduce or eliminate the need for commercial fertilizer input. He works on bale grazing, grass finished beef production an extended season grazing systems. Greg lives in farms in southern Woodford County outside of Lexington, Kentucky where he produces beef and has experimented with bale grazing for 10 years. Welcome to today's webinar.

Thank you JB. Welcome everyone else. I'm glad to be on here. Let me quickly give a brief introduction in terms of how I was introduced to bale grazing and give you context there I was introduced to bale grazing about 11 years ago by an extension colleague in New York where I am originally from. He had been bale grazing on his personal farm 445 years to improve fertility of pastors in Hague ground and I was so impressed with what I saw I brought the idea back to Kentucky and experimented initially the first year and and probably three or four years I was competent enough that implemented well it would work in Kentucky and have the right management and knowledge to do it. Is started working with the dominantly producers about six years ago and every year and and one or two more that I worked with directly. What you can see in the rest of my presentation is a summary of those collective experiences and that will get us moving forward here.

I thought would would be helpful providing a little more context is to talk about our other options for feeding during the wintertime. I know we are going to have people from all over the country here. Both now and maybe later on, the techniques you are going to see that work in Kentucky and Virginia when JB starts talking, think of those as general concepts. You may have to modify those based on your geographic location. An example of that, probably most people get familiar with bale grazing and has seen pictures or videos of the Great Plains of the Dakotas in the Saskatchewan Alberta area they typically bale grazing a pretty high densities. That is one thing they have had to change in Kentucky. I am in what we call the upper South and we really have more than one or two weeks of frozen continuously in the wintertime so we go through a lot of freeze cycles and a lot of rain. It is rare for us to have dry or frozen ground the bulk of the winter. The bulk of the winter it is going to be fairly wet. We have to bale grazing much lower density. Just kind of a word of warning. You will probably want to adapt what you see here to some extent. What we are looking at in Kentucky is what we call euphemistically a dry lot. The picture you looking at looks extremely die but we all know if you live in this region that quickly turns into a mud pit. I think we can all agree this is what we are trying to get away from, at least in our region so we have tried different things to maybe get around that. One is a feeding pad. What you are looking at here, Mike yes this is probably one of the earlier feeding pads built in Kentucky. You can look at the picture. It is an improvement from the dry lot but it has problems of its own. We got some erosion going on and by the way, we had merged our presentations so my pictures are skewed out word a little bit so they look a little strange. It may be hard for you to see if there is a fair amount of rock exposed in the area that you can see dirt so we had some erosion going on. We are probably getting used to fraction nutrients. Even if they are scraping them up and spreading them later on compared to what we should be getting and we will go to that later on. We still have some problems here. You could argue this is an older feeding pad and we can do a better job now so I was show you a picture of one that was built a couple years ago. The feeding pad was built by Kentucky State University. They have a research farm and I've been working with them a couple of years now. They had just built this feeding pad when I started working with them. They saw presentation on bale grazing but they had built this pattern wanted to try it out. By the way, this just wasn't willy-nilly. This was designed by the director of environmental compliance at the University of Kentucky. Hopefully this is a candlelight version of the feeding pad the cost $12,000, a lot more I would want to pay to build something like that but again I am assuming this catlike version will get Cadillac results. How effective was it? The next slide will be after not quite one full winter. I will let you decide for yourself in terms of the results. Kentucky state, it is not what they were expecting. They were hoping for something that worked a lot better. This probably isn't typical for some reason. They may have had two-minute cattle and a lot may not have been designed. It was a disaster. All I can tell you from my experience, and I don't have to go searching, these things just really turn out like they were built. We see the picture and it looks nice and it looks like we will have things under control and tame nature but for my experience it really pans out. Maybe not this bad but it really pans out.

Here in Kentucky the last two years or so I have been a lot of buzz about compost bedded pack barns. It was wonderful. It was the Taj Mahal for cattle. They are in luxury here and it does everything to solve the environmental problems we're talking about. The cattle are in here the winter and not going back and forth and causing erosion. Even better all the nutrients that come out the back end are tied into that high carbon in this case sawdust. It solves all of our problems, at least initial ones but it creates one huge problem in the process. That is they are not cheap. They start at about $100,000. This one was for 35 cows and it ended up costing between 140-150,000. You have the link in the handouts. You can get to this and I encourage you to look at this article because I did analysis on all sorts of scenarios so you can pick the one you think is most representative. Let's say 99% of the time it is not going to pencil out. For dairy it is a different matter but for beef cattle for cow calf operation, I will make the statement even if it is 100% cost share, the operating costs are that high. Please look at that article in if you have questions let me know and I would be glad to run a custom analysis if you have addiction deaf rack [Indiscernible] it just will not pencil out.

What about unrolling hey? A lot of farmers in Kentucky like to unroll hey. I see the same in Missouri and Virginia and I really like unrolling hey. It leaves the nutrient distribution and does a wonderful job. There is one big problem with unrolling hey that is hard to get out. We will look at a quote from a farmer in Missouri in the second but unroll hey in this you're willing to have hey waste you're going to have to unroll every day or every second day. In other words you have a tractor out there a good chunk of the time. Your machinery and labor costs will be higher than just a dry lot or a feeding pad. It solves one problem but creates another and that increases your labor machinery costs. Even every second day there are certain times you we would be out there when you really shouldn't be.

I don't do a lot this but I got this emailer a few weeks ago for misery near St. Louis. I don't typically do this but he does a good job of summarizing some of the problems. Like I mentioned like the nutrient distribution they get. When the ground is frozen you get lots of ruts and turning of pastures. The other thing I didn't think of that much detail, he is saying they probably get a little colder weather then we get in central Kentucky but when the conditions are good and the ground is frozen they're having a hard time getting their tractors to start to roll the hey. He made -- certainly some situations where it is warmer and dry and you have good conditions but the point he is trying to make is there is a good chunk of time during the winter when they are trying to unroll hey were conditions are not conducive to doing it well. What if we could get the benefits in terms of good nutrient distribution but without those problems we are seeing here with unrolling hey. What we didn't have to have a tractor every two days or tracker for a month at a time. With that be a good system to have? That is what you can get with bale grazing if it is well-planned and well executed. That is what JB and I will focus on the rest of our presentations. Again, my slides are going to look a little funky so hopefully it works okay. Generally late fall or early winter, you take the hay from storage. You said it out on the past year. Kind of a checkerboard fashion. Start with your water source and the water source -- just like rotational grazing you would allocate how much you want to give her the time so in this case access to three bales increase those bales

and then you going to move on. Each one of those moves, that might be twice a week or once a week, it depends on the situation of how many cattle and how big the bales are. That might be a week on one form or a month on another. Everything is very flexible. If you want to see it from a picture of you, they just set up about 10 minutes before it took this picture. The water sources to the right, about 100 feet. One thing this form started doing that I have been doing for two or three years, on bigger pastures it is handy to split that and have first like they did where I'm showing you the dotted line and then -- halfway across the pasture so the pastor moves quicker and they get done with the first have an do the same thing on the other side. You are not going to get all the details in our presentations here this afternoon. That is just an example of a trick I have learned over the years that I can't possibly share all the little things I have learned but JD and I will be here if you're interested in hearing more about this in the next year or so.

All the farms I worked with -- you split the hay up like that. If things separate -- two minutes round trip. In his example, the farm JB worked with, there is a trade-off between if you don't use rings you can have more hey waste but a reduction in labor. -- Mostly out of the state that don't use hey rings. There is before that is before we feed it out. The next picture you will see JB will cover the slide in more detail. I'm going to highlight that right there. I [Indiscernible] in her area we have to be at lower densities. Somewhere around two tons of hay to the acre it is what I like to stay at or under when I am bale grazing so just for context a five by five bail, [Indiscernible] two tons to the acre. We are talking about a very low density. That is in my opinion the key to making this work in our area. JB is going to cover that slide in more detail later on. This is the question or concern I get most often in terms of people being hesitant about bale grazing. They are worried it will potentially destroy their pastures. The answer is if you're not careful and if you don't execute well you can cause a lot of damage. I'm going to start with a picture that shows that. This was a my started working with this winter. Let me explain the context. They fed at about twice the recommended rate. The reason he did that he has a fair amount of printed pasture that he uses during the summertime likes to bring the cows back in the winter to his own farm to have them altogether. The a consequence effectively is overstocked on his own farm during the winter in terms of acreage per animal. He has a feeding pad, but if you were trying to bale graze that can cause a problem because essentially you're going to have to feed at higher densities to get through. He knew he was going to have to feed part of the winter at the pad but wanted to feed about half the winter in bale grazing into make that work he had defeated a higher density. He was doing fairly good until he got to that point and about 2 1/2 inches of rain. -- And where the cattle were for about the next four days. That area got plugged up, worse than I have seen. He still had another pasture and bale graze after this so he decided to keep it at a lower density. The key to bale grazing is learning how to adapt by what you learn as you are moving along, especially the first year. This is what I like to see typically, close to two tons to the acre. By the way this farm did try experimenting without hey rings and this is during that time. Hopefully it is obvious where they had just -- a little more residue than what they would have with hey rings. It is not terrible, you're just going to have a little higher waste. This was also -- they had just over an inch of rain when the cattle were eating the bales for about two days. This

is typical. If you get rain, you will have some flooding around the bales that they are feeding on at the time. The bulk of the pasture, the two bales we looked at, you can see we still have a lot of manure in the area. If everything goes right, and in this picture they were feeding -- and they got lucky and if they had a wet spell they would've had a fair amount of damage but they got lucky and you can see you can have some incredible nutrient distribution. Typically we do not feed at that high of a density.

This is on the farm I have been bale grazing for about 10 years. This was a year ago. This is typically -- you can see what I call the impact zone around for the Bailey's. You have a tuft of grass that remains in the middle where the bail was that. The reason you have that is because cattle aren't walking on that into the very end when you're pushing the bail around a little bit. You going to have an area that doesn't have sod. You have some leads in that area. Think about what is going to look like in a few years. This picture was taken at the same time it took the other picture about 75 feet away in the bail I fit the previous winter. It had one full growing season to recover. We did receive -- this is the situation where we did that. -- Very quickly the impact zone to kind of fill it in and you can see after one growing season it looks pretty nice. If we zoom in it looks even better. My comment here is if we are destroying our pastors to bale grazing I wish I could destroy a little bit more because from that point it would look something like this. Don't worry so much about the first year. Yes you will have some weeds and bear areas but as soon as you see the end of the first spring season it will look something close to it.

That gets us to the question I have here. In the short run you have some impacts to that pasture in the impact zone for sure. There is no getting away from that. [Indiscernible] you're going to have some of that selection. Again if were talking to tons were talking four bales to the acre. To me more importantly in the long run, how is the pastor going to look if you bale graze versus if you do not bale graze? I'm going to show you a slide to give you an idea. This was a few years ago sometime in late May and I was sitting at the next pasture and I was going to give them about two acres. As I was setting up the forward fence I came upon a spot that was clear in an area that had bale graze to probably four years before that. The reason it was obvious it was -- in an almost perfect circle. Once you used to bale grazing for a few years you will see these things. It looked so good to me I decided I would like to see what the cattle think about this. I set up my own little experiment. That circle should be down to the right a little more. What I essentially did was I give them a sliver of the area to bale graze. It was probably a two to three foot sliver I gave the cattle access to because I wanted to see how close they would come to that temporary fence which had about 8000 volts on it. This is less than five minutes after I gave him 24 -- 24 acres and have to hurt is crowding the fence and the other cattle if you look in the back of the pastor are working their way back toward these other ones. The cattle are telling me everything I need to know. They told me the best porridge I had aren't areas that were bale graze two years ago. From now on that is my plan. We essentially put commercial fertilizer on that since I bought that. We are bringing fertility treatment hey that we are buying.

This is almost the opposite extreme. This is a farmer took over management two winters ago. It is slightly skewed not too bad. What you are looking at is roughly were the hey -- impact zone the year before. I know there were people -- you may not recognize that but the light color grass is an indicator of low fertility and in this farm it is a combination. I purposely set out higher concentration the first year and I try to target the thickest parts. The year I fit that the broom Sage was thicker than anything in you see just one but a bale grazing. My guess is in one more growing season all that broom Sage would probably be gone. By the way, the reason this farm has poor fertility after talking to neighbors, essentially this had been hade continuously for at least 20 years. Severely depleted nutrients. I will bring this farm back to life without one pound of commercial fertilizer. It may take a few years but I will get there

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The increase in fertility is usually the first thing people think about but if done right and planned right you can get a sharp reduction in machinery costs. This is the third winter they bale graze on this farm. The first year like with any farm you were going to make mistakes and learn from them. They came back the second year and did just about everything right. The thing they did not do that I was trying to get them to do is setting out most of the hey in chunks. Two or three chunks so you can send out a lot of hail at one time [Indiscernible] they would bring out one load at a time and one wagon load at a time until the third year. Late November around Thanksgiving they put out the bulk of the hey. That winter they needed 68 bales and it took two people and took three and half hours. From that point until early March, in other words the stockpile you see there for 40 count heard would last them to early March. They never had a tractor on the farm. Then it took them about 45 minutes every five to seven days to move the fence. I did the math. [Indiscernible] if you take all the labor including the tractor set up time, the seven personhours it works out to 14 minutes of labor per day on this farm and again roughly 40 cows operation. Think about the farms you work with and roughly during that size and think about how much time they spend on and off the tracker. That is everything combined in my guess it is hard for us to beat that. In terms of the tractor time worked out to two minutes a tractor time per day. Again, pretty hard to do. You got to do everything right and did everything right to reach that. The next year they messed up but it is achievable. There is not a lot of good research on bale grazing but there was one set that was really good so I'm going to give you the summary and the highlight of that. If you have additional questions, you can contact me. Basically they split the hurt at the University of Saskatchewan and -- have for fit in dry lot. I will show you the three treatments. The bale grazing in the dry lot in the same amount of pasture was scraped up and set on and of course the control. What I'm going to show you now is the forge production for two years. It worked out that just about a ton of -- which does not sound like much in Kentucky but again this is Saskatchewan. I think the get 12 to 15 inches of rain so that may be average. The dry lots are the pasture and almost 50% increase in production so that works really good. Almost 50% increase in production, it looks like were getting a lot of benefit from the manure. That looks good into you compared to the grazing which double the production as the dry lot treatment. To me it is just phenomenal. The question I want you to think about quickly that we will talk about next is how could we have doubled the forge production with bale grazing in the same amount of manure and whisper at all that manure on the pasture from the dry lot so how

did we double the forge production for the next two years with the bale grazing? We now think about the dynamics. Cattle urine, the nitrogen component will vary but generally about two thirds of the nitrogen will be in the urine. All the inorganic nitrogen will be in the urine. Almost all the potassium is in the urine. Now couple more questions so you can put the pieces together. Which nutrients are generally most important for making -- generally the two most important nutrients are nitrogen and potassium. How are you going to capture that urine on a feeding pad dry lot, etc.? Hopefully the answer is obvious, you're going to have a tough time. If you have any doubts you can do your own experiment. Take a container of water and take it to the feeding pad with a front end loader.

Other advantages to bale grazing. The fertility method is usually number one. The labor and machinery cost is probably the second thing although I would say almost equally important if you did the second one well, there's a couple of things I found over the years at first they weren't apparent but after I started working with cow calf operations they were in terms of importance. The first is improved nutrition. Let me show you in pictures what I mean by that. You have seen this picture before. What is going on is they are bale grazing but they are doing that in conjunction with stockpile. For a few years I did the same thing this farm did. For number of years we would go through -- graze down the pastors by using good rotation grazing. It finally hit me, why don't we start beating hey earlier with bale grazing -- if we combined the two we can balance the diet out and that is what they are doing. They would just let into this area. This is what they would do, they will be there for the first two days and fed the hay and will be moved a few days later. Generally in Kentucky are average quality of hay is maybe 8% protein which is less than what we probably want so if the hay is 8% protein and the stock pile is 16% even if you're only getting 25% of the diet from the stockpile we are still bumping up the average protein in the diet to probably 10% or so which is going to help them come through that wintertime.

This is the same farm the first year they bale graze. Essentially the quality of the hay is the quality of the diet.

The other secondary advantage that I started to appreciate is just overall improved herd health. Part of that could be having the bail and the stockpile together but what I mean here is additional things. Mainly what I'm thinking is improved living conditions -- the fresh new sod that has not seen a cow for a few months. One comment I have got, [Indiscernible] the farmer said I cannot believe how clean the cows coats state all winter that is typically what you see would bale grazing. I'm going to use Kentucky State University because I have a picture from all three different feeding methods. This is their dry lot. Think about the cattle living in these conditions. By the way they are a calving -- fall calving. There should be calves somewhere. He was can stuck you state with their feeding pad. Unfairly representative of the feeding pad that I have seen you beating pads that didn't have significant mud problems. The overall -- this is Kentucky State University in 2021. January of this year. This is the second year of the bale grazing. I'm forcing them to use -- for experimental reasons but they were bale grazing for about a month and half. Put yourself in the position of a cow and how you're going to come out

of winter on something like this. I think Kentucky State is moving them every three or four days on fresh pasture that hasn't been touched. Just visually, they have done a good job in terms of their density. What you are saying about the cattle that is strictly to tenants of hay per acre. This is Kentucky state a few weeks later. What I want to highlight, there is some of the calves in this picture, think about the calves in a situation like this versus being in the mud. Here's one of the other forms I have been working with. Some of the calves are even smaller so think about how the calves are going to do there versus another situation in the mud. Again, generally people think of increased pasture infertility being the number one benefit. I was used to believe -- improved herd health is really difficult to quantify that may be just as important as either one of the methods it can be more important to some farms that have problems right now related to that.

That is the end of my presentation. I think were going to take questions at the end. Please feel free if you're interested in bale grazing and you want some guidance, please contact me. That is what I did with JB. It didn't take much time -- while he was working with the farmer. Just someone to go to to have a two minute conversation sometimes can avoid a major problem. Please contact me if you're interested in working with the farmers near you. That said I think JB is going to take it.

All right, thank you for sharing.

Thank you for sharing your experience and what you have been able to document in pictures and in data with your experience over the last 10 years. Were going to scroll back. That is the end of my presentation for some reason. Bear with me for a second. [Pause]

I will be the first to admit when I heard of bale grazing, I had seen some pictures of bale grazing being implemented in the planes and I didn't think it applied here in the eastern U. S. in the mid-Atlantic region at all. Other people were asking me about it. I knew Greg had done some work with it and he was talking positively about it and wanted to try some in Virginia. It was last year around this time that I called Greg and asked him to explain it a little bit more. I was pretty upfront with him. I said I think the climate here in Virginia, the winters are just too wet and our weather is too variable. We go from cold to warm and cycles throughout the winter. I said I'd take it would be a destructive practice. He said just give me some time and let's talk and he showed me -- did a private presentation on the computer and I was able to ask a bunch of questions. At the end of that hour and a half he had convinced me to have an open mind about the possibilities because the picture he was showing me, some of those you saw today in his intro. It really opened my eyes to maybe this could work. Before I would be comfortable encouraging farmers to do this it is a different type of feeding strategy, I wanted to see how it would work for myself. I wanted to find what we would consider a traditional farmer who could implement this in a controlled setting on their farm. Following Greg's protocol to see how they would be him to manage it and work over the winter. Things fell in place from last -- the local conservationists called me and she said I need some help developing a feeding plan where they need to be hay although fertility soil. Can you

help me develop a plan? I said yes and it clicked in my mind this bale grazing strategy might work for this farmer. I called him on the phone and talk to him and we set up a time to meet with the conservationist and a kind of went from there

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This is Mr. gills, he works a full-time job off the farm so he basically farms in the evenings and on weekends. He loves his farm and his cattle and does a really good job keeping things up on the farm. He spends a lot of time in the summer making and putting up a and spends time all winter long feeding the hay to the cattle. He manages about one-handed -- typically runs out of standing forage sometime in the middle of November and then feeds typically until about the middle of April so plus or -150 days annually he is feeding hay to his livestock. He admitted when I approached him about this he said I'm not sure. I don't have a lot of extra time. I work full-time and I'm not sure this would be something I want to do. I told him based on what I understood about this I thought it would save them time and money over the winter and two, hopefully cause less damage to his pasture then feeding in a confined area over the course of the winter. And he would probably get some payback in the nutrients in the hay directly spread on the pasture by the livestock as they were grazing. After that visit he decided to try it. Basically at that point the next step was he admitted to taking up-to-date soil samples and got this results back pretty quick. I was able to look them over and using the maps of his farm as you see on the aerial photograph, I was able to identify the fields we wanted to target which had the lowest soil fertility levels. You see those circled in red. We wanted to avoid the historic hay feeding site kind of in the center of the farm. Once I got this put on paper, we put together a simple plan. He told me typically fees 450-500 bales per winter. We were able to avoid the historic feeding sites and target the lower fertility soils and we did beat on other fields as well and we fed on a higher density on the low fertility soils.

These are four of the five fields. Greg told us, he said you can beat at higher levels but the first time you try to do the bale grazing he recommended as not stocking the bales any higher than about two tons per acre. You never know how are producers going to manage this over the course of the winter. When you get over two tons per acre if it gets wet you can experience more damage to the pastor. That is what we decided to do. We decided to go up to two tons per acre on these fields and in the one ton per acre on some of the other fields. When you're looking and helping producers plan something like this. In general you can see this levels on about half the pasture acreage . The one thing we wanted to avoid in this planning process, we wanted to avoid stocking bales in low areas of the field, the drainage swales or by any Creek.

Once we got that set, the next thing was for him to -- while the weather was nice and the soil was firm he was able to load trailers and take one out in late November before things got wet and he was able to stage hay at the time. He could put out about 50 bales in about three hours. We didn't put out all the hay it wants. You never want to put it what you estimate being 100% of your feeding needs. You may have a shorter winter and you don't want -- to take back to the barn. If you're going to target putting it out sometime in November or December before things get really wet, targeting 80% of the time. He was really concerned and worried about his hay rotting in the field. When it got

started he set some out and said I am the talk of my neighborhood right now and they are all making fun of me. I spent all summer making hay and getting it in the barn so it doesn't get rained on. He said now I'm scattering hay all over the my pastures. We will see how much if any of it rots over the course of the winter and we will talk about that then. After he got some of staged it was time to start feeding or bale grazing rather. He set up the temporary fencing materials. I have got a partner here in Virginia and for Dallas like this, they loan out some of these electric fence supplies. He loaned me a kit of 50 step in posts, two reels full of poly wire in a solar charger you see the picture. All of these components combined total of almost $800 in value. They were loans for the duration of this demo to help it succeed. After he got started doing this, he was doing this on half of his heard. After he did this he went out himself and bought a comparable set up of all of these supplies a put it in place on the other side of the farm with this other heard. He was literally bought into the practice two weeks in and that is encouraging. Once he has the bales set in the fences up in time to turn the cattle in he goes in and flips the bales and pushes them up and, just the ones the cattle will have access to at the time. He puts the fences up so in this case it was about four bales for every other day for his heard. By flipping them up on the end, he was using the biodegradable balers twine and he didn't want to buy the hay rings. He told me I got rid of my hay rings. Now I've got wagons in your telling me to go back out and buy hay rings. I said let's flip them on and. He was going to leave the strings on. It made the cattle have to work a little bit to get the hay out of the bail and it kept it together instead of falling. It didn't spread out nearly as quickly. He thought it resulted in less waste of hay over the course of the season. That was an unexpected plus. He would allocate one or two days worth of hay and allow the cattle to graze in feed on that and then he would allocate another.

Let's look at these comparable photographs of the different types of impact to the pasture surface depending on the weather at the time the cattle had access to these bales. On the left you can see the majority of the bail sites were just like this. Dry weather when the soil was firm. A thin residue of hay spread out a little bit beyond for the initial bail was set but you don't see any noticeable damage. That is what the majority of these looked like. I would say at least nine out of 10 in this many out of 14 -- in contrast with the weather turned wet and it was raining and they had access to bales on the right you see what it looked like. The hay residue in the center and some significant -- cattle hopes may have gone in three or four inches. Let's look at that a little bit closer. That is one thing people ask, what is the extent of the disturbance? At the end of the season I took some actual measurements and stretched the tape across their and the diameter from one side to the other was 25 feet across. In the center it was about a 13 foot diameter of the leftover hay residue. The high impact sites was grazed where it was really wet and a ticker map of hay. You can see the inset were lifted up some hay and it is several it's that hay and that was only on those sites were it was rainy and wet. Then there was a good six feet around the entire circle where the damage was most severe. When you look at the square footage of the area on the site impact sites it is about 360 square feet.

In contrast to that, if you look at the bail sites the hay was scattered about 21 feet across and that there part was about 15 feet. When it was dry and they were grazing they cleaned up more of the hay. It was a thin layer. You can see in the lower picture the grass is already coming through pretty well in the first part of April. There is virtually no damage on the outside of this ring like it is otherwise. In both of those bales, they were probably dead or grazed in March. Let's compare that to the residue of what is left to one of the bales that was fed earlier in the season like in December. It is roughly the same size circle. There is very little residue left just from December until March. A lot of that has sort of decomposed and weathered away in the grass started coming through. You see the close-up inset pictures.

Let's look at it from an overall perspective. We had a fairly wet winter this season. Is started getting rainy and cold the end of January. The rainy spell lasted with winter and ice storms on up until the first week of March. When you look at it as a whole from this photograph at the height Bay Dale -- density on the left you can see there is very little damage overall. It just looks like a polkadotted landscape where the bales had been set out. If you look closely, you can see there is a few of the sites where there is a little more disturbed. There is if you there and in the back. On the right-hand side where the drone got directly over one of them and zoomed in, that is what I call high impact area. That is may be one in 15 sites that ended up like that. We followed Greg's suggestion and on January 24th, Mr. Gales went to the pasture and each one of these high impact sites he frost seeded clover and fescue. He didn't do the rest of the pasture, just the high impact sites. At the same time he came back in March for the remaining ones and frost seeded those. His hope there's some of the clover and fescue will come in the nutrient rich sites that were disturbed to help suppress some of the weeds that would naturally enter the first season. We will see how that does.

I just want to knowledge -- he came up and flew this with the drone and provided these photos and some videos for me.

Looking at the drone view, you can see on the left side of the screen this photo represents the bail locations stocked it to tens of pay per acre as compared on the right with the one ton of hay per acre. You can see the difference there but all of it was managed by the farmer and he followed the protocol Greg provided and very little sod damage.

What it comes down to, what does the farmer think about this? I was able to get some short video clips in about the middle of March at his farm. I listened to him it took some direct quotes from him just sharing on the screen today. He was very positive overall. He said I put up most of my head November when the weather was pretty and the ground was solid. What surprised him as he doesn't have any right from his track. He did point out he still had some ruts from last winter but nothing this winter. That speaks volumes because there is a lot of compaction that takes place when we drive on our pasture acres when the soil is wet. This completely avoided that and that was a big plus. He went on to say it is nice for him because I work a full-time day job. I don't have to fool around with the tractor when I get home. I jump up on the four wheeler, checked

the cows, take offense down and put another up and it has worked out really nice. He found the cows don't waste as much hay because he turns the bail up on the end and leaves the strings on. He went on to tell me he has fed hay in a lot of ways. He has fed with rings and a hay wagon but he's always looked for a better way to feed and he thinks he may have found it now. He went on to say he was skeptical at first but all in all he said I have really liked it. He acknowledged the nutrient and if it has got to be a plus because the cows are spreading the manure of the pasture instead of it being in one concentrated area. That's a big one because that is one of his goals. Build fertility levels before he renovates these pastures over the next five years. Let's look at that a little more closely.

You can see on the left in one of the fields were restocked the bales it two times per acre. There is good manure distribution. What you cannot see is the urine patches. That is where all a lot of the nutrients are as well. When you look at this table Greg put together, nutrient value per acre by bale grazing density. Just focus on the two times per acre row. You can see as you go across there the nitrogen, phosphate and potassium that were estimating that would be available this coming growing season based on feeding the hay in the nutrients available this year. That is only 50% of the nitrogen which is it about 36 pounds at about 75% of the phosphorus and potassium. That is what we are thinking will be available sometime this growing season from the nutrients imported from the hay and spread evenly over the field over the process. That is a big deal to him. What is the cost of hay? In general 60-$80 per ton. For average purposes about $70 per ton that we bring in. This table shows the fertilizer value estimated for hay feeding when you have nutrient distribution like this. If you look here the pounds per ton of hay of nitrogen and phosphate in potash we are estimating is coming into the system per ton of hay right there. Let's say conservatively only 75% of that fertilizer value is going to be available to the plants in the pasture this coming year. Translate that to dollars per ton and add it up and for every ton of hay on average we brought in, he is getting back a value of about $25 per ton on that pasture. That is tremendous where he is feeding two times per acre, that is equivalent to about $50 the nutrient value spread evenly where the plants can use it instead of be in a concentrated feedlot. That is drastically different in a concentrated feedlot that we often see on landscapes and farms coming out of winter. The resolve of challenges farmers have overwintering the cattle. This picture here is a common sight we would often see. This site is managed. It is a concentrated be the area that is managed. You saw the examples Greg showed. This is drastically different than the result we would see with the bail grades. After going through this process, my eyes have been opened at the possibility and the positive benefits we can gain from the bale grazing if we planted and the farmers manage it in the right way. I consulted with Greg in September to get this started and he said there are a few requirements to make it work. Number one having an open mind and a farmer that has the capacity for advanced planning. They've got the have the ability to turn the hay bales of on and and maybe move hay rings and cattle trained to electric fence. For everybody on the webinar today, you work with farmers and help with planning and encourage them to implement as planned. We have got a lot of farmers who feed a lot of hay over the winter and is smaller percentage that have the stockpiling in the fall and that is the pinnacle in my opinion as the best situation. We

have got a large population of farmers who just aren't there yet. This bale grazing technique is I think is going to be a productive tool for a lot of traditional cattlemen to overwinter cattle in a way they never thought possible. The jury is still out for me a little bit. I'm going to go back and monitor Mr. gills farm the see how much weed growth comes into these areas versus how much clover or fescue over the course of this year so I will have the results of that by the end of this year to add to this presentation for the future but I just want to acknowledge and thank Dr. how much for opening my eyes. I want to thank Mr. gills for being that farmer and having the faith that I wasn't leading them down the wrong road and managing it like we asked. Make -- Mike for the drone and the video in a shout out to the Chesapeake Bay foundation for providing portable fencing materials to make it work.

At this point that is my last slide. Were going to transition to some questions and answers. We will go ahead and get started with that. Anybody has a question, you can add it to the Q&A box on the right. I'm going to get started with this.

Very quickly, I don't know who is monitoring questions but I'm not completely used to system. I was going to questions we were talking and I accidentally deleted a few. I apologize. I was reading them and when I click the button it would minimize it so I did write down the questions I deleted but I just want to give you heads up there were few questions asked that were no longer on there

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That will cost you twice today. Do you want to start off with those you wrote down?

I'm not sure which ones I will now that I deleted. I was writing down all the questions I was reading.

I happened to notice on the second or third one it deleted them.

We will get started with somebody is right here. We have got about 20 more minutes and we want to get through fair amount of this questions. One of the first ones up there was what time it will rings were you using? They didn't look like the normal steel bail rings?

This is a good question but you can use regular steel. I have used a mixture. The ones I showed in the pictures a few times, they are plastic. My understanding is they are a special plastic that comes out of I believe the natural gas well sites in Texas and Oklahoma. The first one I saw on one of the farmers I worked with, I'm thinking these things are junk and they will be broken within one year and four years later I'm buying some because they are the most indestructible things I have ever seen in there also very light. About the third of the weight of metal ones. I don't know the actual name but if you go to a few distributors and ask them for the high quality plastic ring, they are the only ones I know they make them out of.

So they should be fairly easy to find. Another participant commented there's a certain amount of hay waste in a process like this. Theoretically that would provide a lot of

organic matter into the system. Do you have any data or measurements on any of those benefits from this leftover hay for several years in this type of process?

I have no formal data on it at this point. I guess I failed to mention there is a group of six states, I'm leaving it but we are trying to get grant funding to measure specific things like that. Those areas that have the hay waste in them, again the first year you will have a lot of weed growth. After one or two years they will be some of the best forage in the pasture. In the long run those areas that have the hay waste in addition to some of the nutrients will be your most productive areas in the past or in the long run.

That is good to know. We have participants from all over the U. S. today. Summer in the northern states. Do you have any suggestions on how to move -- when the ground is frozen?

Usually a couple weeks in the winter things will be frozen solid. I have seen the ones that I really like that are easy to handle and you can carry a bunch of the time. They are essentially [Indiscernible] with an attachment -- when it is frozen you got to carry a hammer around rather than trying to stuff it in because you in the breaking the portion of it. Hearing ground froze all the time you probably want to do you supposed for the metal spike. [Indiscernible] they look kind of like a pig tail but they are a lot lighter and convenient to carry. I was living in upstate New York where I'm from, probably I would want something like that because that soil will be frozen. Those I think you can step them in even and frozen ground unless it is frozen really hard and maybe then Terry of -- hit a pilot hole. I do know people in northern climates that bale graze or rotational grace and seem to do fine. I just don't have experience with it.

I will add in another example, at least down here where it is not frozen all the time but if we know were going to get four or five days of below freezing weather, if you've got the extra posts is good to set the post and at that time. You can always set the wire up later but you got them in the place.

Here is a common question. When you recede or frost see disturbance it is, what do you put in the mix? It looks like most are just clover.

I showed you the picture, essentially one full season and usually the first to spring it will look like mostly clover but the first year, every different geographic region you were going to have something different. What works for me in Kentucky may not work in northern Missouri or Central Georgia or whatever the key is to include in your mix something that germinates and grows rapidly and maybe just for that first year. That is Italian ryegrass that provides quick cover. Clover is definitely in there, that is kind of a long-term thing. In terms of long-term grass -- Italian ryegrass and orchard grass. I even put mammoth red clover in their. What you really need and work works well in Kentucky and my guess in the fescue belt is something like chicory or planting and I use both because they have strong roots and help break up the compaction you will get even if it is not muddy, you will still have compaction so for me that is the planting in the chicory. You can get them from various see distributors. I like mammoth red clover because it is

a little bit stronger. I hate giving you specific mixtures because they are probably going to change based on location. You want to pioneer species to take the first year to provide quick cover, I think oats work well. I've had the idea and I keep forgetting about it but something to germinate that gross quick and something to break up the compaction layer and something you want there long-term.

He was another question people often ask. Won't putting at the bales to early, one or more months before they are used, won't that result in losses of hay quality? Especially in the warmer weather areas like the mid-Atlantic and coastal plains? I was start with this Greg and then go to you. That was the major concern of Mr. Gills. Near the end of March I talked to him in the a threat -- said 373 bales at that time. I said how much rot did you have? He said he only had one bail that had any significant rot. He said I can't tell you truthfully, it might've been the way it was put up and had taken on water early. Greg, can you explain why we don't have the rot we would normally expect?

I can give you my lay version. This probably someone out there that can give you the scientific reason but the way I look at it is there is really two main things you need for hate to rot, one is you got to have moisture and the other is heat. Which of those aren't you going to have is a December, January and February. You don't have much heat during that time. I don't know if that is the scientific way to explain it but my experience -- something so close to zero that I'm not concerned about it. If you said my guess is early September you're probably going to lose a little bit. JB brought up a good point, you don't want to set up too much a for two reasons. One is psychological there is a few things that hurt more psychologically than having to but hay you set out back in the barn after Greenup in the to you have to do it you probably don't understand what I mean but it hurts to think about having to do that. The other thing I've noticed the few times I've had to do that is you will have rot there the hay set out and you get some warm days and if you don't put the hay back in the barn, some of the hate I will get rot because we has warm days. You need warm temperatures with the biological act 70 two be active to start not breaking down the bales.

The nice thing is here, even if you only put out say 30% of your bales in November, there is going to be another period of time later where the soil is firm and the pasture is dry and we can put out another 30% sometime later and it may be the last 30%. There is going to be opportunities as long as her schedule is flexible and you can react when the weather is right.

Here is another question that is two parts. Do you keep the cows -- with high water tables? I would say from my perspective in helping to plan the speeding strategy the answer is yes. We have soils on the ground in Virginia where the water table maybe within six inches of the surface at certain times during the winter and there is dips and low spots that there may be ponding or flooding at certain times during the winter. We try to avoid those types of deals altogether during the winter season. Here is the other part of the question. On Upland fields where you have weather conditions were the soils get semi-saturated, is it important to move the cattle off of there during those times to avoid putting?

It's a good question. Let me craft this by saying I'm blessed to have mostly -- on both of my farms. That is one of the reasons I wanted to work with farmers that have slightly different conditions. Two of the firms I worked with -- something close to it I showed you a picture of that had pugging. The best answer I can give is I think you can bale graze on just about everything. You just have to be flexible. You don't want to originally go from pasture to pasture. You might start with one and then go to another one when it gets wet. Be flexible in your bail grades. The other thing I was say is we have limited time so I was giving you the basics but one of the things I have been doing the last few years on one of the farms I have working with has done an incredible job with this is we had been starting to bale graze in early fall and in their case they started in late August when we had a drought. It allows you to slow your rotation down in the fall and allow the bulk of your farm to stockpile so another words most farms don't have -- to do any stockpiling. One way to get around that is to bale graze earlier in the fall and slow your rotation down and that allows you pastures [Indiscernible] the fall feeding period, even without a drought think about this typical September or October whether. That is the perfect time to bale graze in those areas.

Good point. Here is something we covered but we need to reemphasize to the group. How many bales per acre do you recommend stocking this?

First of all I never talk about bales per acre because if you're using -- is going to make a big difference so I was taught tons per acre. If you're in Saskatchewan or North Dakota, you may be able to feed 10 tons an acre. If you in the upper South, I think two times is a good maximum to start with and that over time with you management and soils if you feel you can do more, go for it. Someone made a comment I think [Indiscernible] they made the comment if I only feed [Indiscernible] my guess is in northern Vermont you can probably feed at a higher density than two tons. Take the concepts we are showing you and adapt them for your region. That is part of the key. You just can't take prescriptive live what we are doing and hope it is going to work the same in your region. That was a good point, if there feeding more hate it's not going to work as well but my guess is they can feed a lot more than two tons per acre in northern Vermont.

I was say it also depends on the situation and what the goal is. For these fields Mr. Gills was to build the fertility levels in, it was a good recommendation was not to exceed the two tons per acre. After seeing how well Mr. gills managed it, I think he has one more winter feeding season. The following year he plans to renovate that pasture. Based on how well he managed it this year I'm going to encourage them to update to three or four times per acre bail density this coming season to boost those fertility levels to hopefully minimize how much he has to put down at planting and when he is renovating. With those higher bail stock densities [Indiscernible] and so forth. Things like that have to be figured into your plan.

There were a few questions related to water and I think that is a real important question to maybe address that neither of us have had on our presentations. First of all if you are in an area that is a fair amount of winter grazing, the concept for water is really no

different than if you are working with someone -- my guess is the question may be from somewhere in the northern U. S. were typically you are not going to be on pasture during the wintertime and worry about the water sources. All I can say is you can get away with more in the wintertime then you can during the grazing season. It may not be ideal. Obviously the closer you are the better. There was one winter where we get serious about bale grazing that we did not have a good water system or winter water system, and we still don't have a perfect winter water system. We were probably making the catalog, I don't want to say half a mile but about a quarter of a mile for part of the winter. They can get I would getting water once a day during the winter and they can't do that in the summertime. My first point is they can walk a lot further in the winter than the can the summertime to get water. The creative. I've had a number of wet weather springs on both farms that you could not use in the summertime but during the winter in those situations I set up a small pool in both of those water sources and the cattle get the water, at least part of the winter in those situations. Are the NRCS approved? Probably not but you can get long with a whole lot less but you have got to think that through. There are some pastors we will bale graze in this season. Mid to late fall because we can get by with above ground water piping. Even going into late November we are going to have a few weeks at a time where we might get down to 30 degrees and we will bale graze those areas when we have good weather if we have a cold snap coming in. [Indiscernible] and when we get the mild weather we will put them back to bale graze but we will be done with those before the heart of the winter hits so we will always have good water type conditions for the middle of winter. Just be flexible and creative.

Great, we have got more participants signing off from today's webinar. We are at an hour in 30 minutes. I want to make some comments before we start losing a lot of other people. From the conservation aspect in helping plan some of these sites in seeing what Mr. Gills and what he can do the first time he tried it, it has been really encouraging. When you look at these photos from the drowned -- the drone, it is better in my opinion than the concentrated feeding areas we can typically see. When you are thinking of ways to manage nutrients coming into the system and capturing the nutrients and giving positive benefit back on the pasture, bale grazing is a very effective tool that can be employed throughout Virginia. You've always got to be flexible with your management. For those farmers used to stockpiling in strip grazing, in the false that are dry and we don't get as much stockpile, bale grazing can be used as a supplement practice to stretch the stockpile and spread this nutrients and have them out on the pasture for the duration of the winter. For farmers to have never been able to stockpile in strip graze over the winter, this might be a more realistic practice for feeding hay over the winter for them. It might be a good first step in that direction. I also see this practice being applicable to farmers bringing maybe some new ground, something that has been converted from maybe forest land brought into production and need more nutrients to build fertility levels in the soil were some fields that are isolated like these, noticeably lower in fertility levels where they have got to be renovated in a few years where you can target doing higher bail stock densities and bale grazing over the course of the winter. There are some places this feeding/grazing technique I think it is made for. Great, any comments before we lose a lot of other people?

Just overall, I am biased. I have been doing this long enough where I think it is good to have the two of us on because you were new enough to this that you probably not institutionalized. From my perspective you're going to have to farmers that never want are pretty much doing -- [Indiscernible]. I have seen two instances where bale grazing would not be the best option for winter feeding compared anything they have. Most of the farms I'm working with have either a feeding pad they are not using at all or sparingly or in one case [Indiscernible] they are not using it at all other than loading animals in and out of and storing equipment.

They are good points. Anything you want to say about the potential for anybody to do some of these control demonstrations on farms in their state?

I would love to see more on form demonstrations. We are doing some in Kentucky right now and hope to do more with states if we get the grant. Again, I'm willing to work with anyone out there that wants to try something like what you did this winter. Obviously if it is in Tennessee or northern Missouri or something like that were can't get too easily, we can do a lot by zoom or phone call or a male. Is a lot of things you will learn the first couple of years. The best way to learn sometimes -- there is something from learning from other peoples mistakes. Hopefully I can help you avoid some of those problems. So contact me is what I'm saying. If you're interested contact myself or JB and we will hopefully get you through some of those hurdles.

I think that is great. If there conservationists on the line and working at a local field office, if you want to do this I would say reach out to you state grazing specialist or agronomist and get together and talk to Dr. Halich. If I can offer anything I will but I look forward to seeing this tried on many other farms in Virginia over the next several years. Jennifer, if we have to wrap this up, just let us know.

The examples we provided show round bales. Certain areas of the U. S., the more typical you put up the large rectangular bales, any reason to believe they won't work as well as the rounds?

I was on the -- I noticed that is all they did was the large square bales and they store them outside. There climate is so dry and they get some precipitation and they told me they had essentially know what doing that. I guess it would depend on your climate. My other concern would be with round bays -- bales you can use the hay ring. [Indiscernible] that would be one of my concerns. Can you keep the hay waste to acceptable levels you would want? In which you have problems not necessarily from actual rotting but the nice thing about round bales is they will shed water pretty well. If you're in an area that gets a lot of rain, probably not. If you're in an area that doesn't get that much rain, my concern would be [Indiscernible] if you waste can be kept to an acceptable level.

How are they flipping the bales on the end?

Good question. I flip them by hand. Someone showed me you can use the hay hook. I think they were more common when people did small square bales but a hay hook gives you wonderful leverage. If you have any slump at all you pre-position the bales so they are pointing downhill even with a small slope. You take the hay hook in the shower and low and you would be surprised at how easily -- for by fives seem to work wonderful. -- I never expected her to flip it on edge. I was there a month going into our first year and I asked her how she was getting them flipped over and she showed me. She just got down with good posture and pushed it over and slightly downhill like I talked about. This people are probably not going to want to try that, I'm just saying that is an option. Some people connect a tow rope [Indiscernible] the ATV it is easy to do.

Another question about how would this bale grazing technique, how would that affect any kind of -- in the soil? Any data on that?

That would be long-term research we might get into at some point but not in the short run. I can offer my ideas but we have no research.

Another question on the surface texture of the soil, with that make any difference? Some surface soils was -- where you are might be [Indiscernible]

I did not show a picture, it is the University research farm in Indiana, they have rolling terrain and a lot of hills but I've never seen anything like it. [Indiscernible] even though they got the not quite super steep the getting close to steep topography I have never seen water -- they had a lot of clay. What I'm getting at is where problems can occur [Indiscernible] in the wintertime were going to have drainage problems and a lot of standing water or water close to the surface. He is bale grazing that farm. I have not seen in the area in the upper South, you just have to adapt your management to make it work. He's going to have more impact. He is making it work is all I can say.

Someone asked would be better to put the hay bales out on the hay grounded possible to let the cows bale graze there.

The answer is yes. If you are making your own hay, where you need most nutrients is -- I purposely did not get back into that because my philosophy is I would people to first crawl, walk and then run [Indiscernible] analogous to running. -- Going to have the least impact. In the long run you're going to want to bale graze if you make your own hay on that hay ground. Maybe five years down the road or 10 or 15 but get your pastors up to speed. -- Get this up to where you wanted. Ed Rayburn from West Virginia University has been bale grazing, I found out indirectly, I learned from extension specialists in New York and that extension specialist learned from Ed Rayburn about 20 years ago. For the last probably 11 years he has been bale grazing exclusively and according to what he has told me, he is not put one pound of commercial fertilizer since he started bale grazing and he is either maintained or improved his mineral content.

We have been able to share a lot of information today. I appreciate you taking your time to present and share this. I appreciate the questions and interest. At this time we have to wrap up. I'm going to turn it up to Jennifer for closing comments.

Thanks JB. On behalf of the USDA and the natural resources conservation service, I wanted to say thank you to Greg and JB for providing the presentation about bale grazing. Thank you again to everyone for attending today's webinar. Don't forget to provide your feedback about the webinar. If you selected to earn CEUs, returned to open browser window. This includes the webinar.
