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Maggie: Welcome to the Young Farmers Food Safety Focus Group series. I'm Maggie Kaiser, the produce safety training coordinator for the National Young Farmers Coalition. Throughout the summer of 2020, I, along with Bre Sliker, Billy Mitchell and Farmer Facilitators from across the country, hosted a series of focus groups with farmers, where we discussed the challenges and successes of implementing various on farm produce safety practices and we recorded them because we want these conversations to be a resource for you. In every session, we bring together farmers with similar experiences for a discussion about a specific farm food safety topic, we begin each one with a farmer presentation, followed by a roundtable discussion where farmers share problems and solutions with one another. We hope you enjoy them and find some practical information for your farm.

[music]

[1:04]

Maggie: So, hi everyone, good afternoon. Welcome to our focus group on produce safety practices, probably focused mostly on hydroponic operation, though I did originally intend to maybe include some people who were working with aquaponics operations, I just don't think that we have them participating today. We'll be hearing from Sarah Ann Horton with Square Roots in New York. So, my name is Maggie Kaiser. I'm the produce safety training coordinator for the National Young Farmers Coalition and I'm part of the business services team there. I'm also a farmer in New Orleans and a nursery grower. I'm gonna pass it to Brie right now to introduce herself. She's been hugely instrumental in getting these focus groups off the ground and rolling. So yeah, Bre will you introduce yourself.

[2:01]

Bre: Yeah, thanks Maggie. Hi everyone, thanks for being here. My name is Brie. I am currently interning with the National Young Farmers Coalition this summer working with Maggie on focus groups and food safety, but I'm also a graduate student at NYU in food studies Department. I am studying agriculture and how to help farmers.

[2:26]

Maggie: Cool thanks Bre. So I would love to hear a little bit about each you. If you could just share your names, where you are growing or working, and why you decided to join this focus group. Gianna, would you mind going?

[2:47]

Gianna: Sure, I apologize once again, if it's loud, I work at the square roots. I am one of Sarah Ann's coworkers. Right now, I'm an assistant farm manager in the farm. My prior job was in the hotel industry. Within that industry, I was FISMA trained and we had a lot of compliance aspects to that and so I've always taken a liking to it. So, here I expect the same and I think as a new industry there's really a lot to be done, CEA specific. I'm pretty excited to hopefully fill that gap and offer some incentives to have these really large mega indoor farms be compliant in one way or the other and hopefully the USDA will follow. I'll pass it on to you Sarah Ann.

[3:44]

Sarah Ann: Thanks, Gianna. Just for context, Gianna manages food safety at our Brooklyn campus and on her first day she came to me and said I think I want to work in food safety. So, she's really our food safety Queen. I'm Sarah Ann and I have been farming for 9 years in both Georgia and in New York. I currently have been working remote in Georgia. So, in some ways we can farm remote, but our production facilities are in Brooklyn and Michigan. Prior to that I was farming in Atlanta. I worked on a lot of different types of farms, soil, organics and then recently hydroponics for the last few years. The way that I got into food is three years of work with food safety. I guess I entered farming in 2011. So, right after FISMA was

passed and right after everyone's like hey everyone should get Gap certified and we're like what's this? It feels like a waste of time. Then overtime being converted on the Food safety training. So, in that, working in urban ag for the last five years, people really didn't know how food safety apply to urban ag. I work pretty closely with a lot of organizations on that. Then working in indoor container farms, all food safety policy, for the most part, is built for outdoor farms, so when you're talking about indoor farming, it really is uncharted territory. I have really have had to become an expert through trial and error and what's working on our bearing facilities. That just doesn't mean the audit, it also means how you clean and how you design for cleanliness. How do you train people? There's a lot of questions and luckily I've had really good guidance. I work a lot with Cornell and the National Farmers Coalition and I have a friend who's a food safety expert as well. I've had lots of community around food safety just to support this and then I got invited here so.

[5:37]

Yolanda: Hi everyone, I'm Yolanda Gonzales. I'm with Cornell Cooperative Extension and I've basically done a lot of food safety work in the form of walkthroughs and just answering questions and helping farmers prepare for gap audits and knowing what a food safety plan looks like.

[6:02]

Maggie: Well thanks everyone for being here. We can kick it to you now Sarah Ann. You can get going with your presentation when you feel ready.

[6:12]

Sarah Ann: Cool, here we go. Let's just start at the beginning. Square roots is an indoor farming company meaning that we grow in shipping containers. You'll see a lot of photos of that as we go, and I'll explain how we farm. We really value transparency of the food system, so you're really getting the inside scoop of what we do. When I started farming, there wasn't really good ways to learn modern tricks of agriculture, whether it be organic, urban, or indoor, and so that really drives me to work at the company because we do have a lot of training and workforce development in agriculture aspects. I've been with the company about 2 1/2 years. I started at the Brooklyn campus farm manager, so I managed all the production there and then I became the farm operations training manager in the fall. So, now I work with a lot more spreadsheets, papers, figuring out how we train all the people at the campus, and figuring out how to improve the farm. There's kind of three things that we value as a company such as scalable, smart tech platforms that means both software and hardware. Just to caveat, this is the fanciest farming company I've ever worked for, but there are techniques, skills, and philosophies that will apply to smaller scale farmers who don't have engineering teams and things like that. So, we like technology that is easy for farmers. All of us have worked with equipment that's really difficult or a waste of our time and you'll see more of that. We really try to focus on that. A lot of these tech companies are trying to replace the farmer or really emphasize low wage workers and then have technology to do some of the more advanced skills. We don't really want to do that. We want to train people to work in agriculture. We know that there's a huge generational gap in agriculture. The average age of farmers is very old. It changes all the time between 58 and 65, but we want young people to want to work in ag. So, that leads us to our next thing which is the next generation training program. Most of the people that work on the farm are actually hired as part of the training program. We've changed it overtime, but I do work a lot with farmer training organizations and figure out what the core competencies of someone in this industry. How do we advance that? Food safety is obviously a huge one. How do we train people in food safety? We work a lot with young farmers and new people and really focus on training, crew development, and then local food company at global scale. So all our facilities are actually relatively small. I think they have between 4 and 5000 square feet of growing, so they're pretty small, but we know that actually can yield a ton. New York is a great example. In the pandemic, it really was kind of struggling to get fresh produce for a minute, so we were able to really tap into that. We view the shipping container models like a creative solution because you can literally send it anywhere and we like that a lot. It's not the only way to farm, but it's an option in places that need it, particularly cities. So, that's square roots. So, how does square roots farm? Let's talk about that. The company has been around since 2016, but we built our own hardware in 2018 because we realized, the other shipping container designs that were out there were really difficult to

work in. So, we built our own design. Some adjectives that would describe our system are vertical, meaning we grown up, modular, meaning grown in a container, hydroponic, meaning we don't use soil, and CEA or indoor CEA, standing for controlled environmental agriculture which is anything from a little backyard greenhouse to a fully indoor plant factory. We work with Phillips for our lighting. These lights were originally supplemental lighting for tomatoes, and we told Phillips we were going to flip them and put them in a shipping container. They were said that was insane, I don't even think you can do that. So, most of the technology we were using is not designed for our application. We use zip grow towers. They are a 3rd party company, but they manufacture these towers that are in the middle and I would say they are one of the most popular vertical growing hardware companies, that I know of, at least. This is our Brooklyn location. So, all of these are the containers. I'll do a diagram next that shows you what's inside the container, and then this is our shared workspace and little office area. We have some decontamination rooms in here and cold storage. This is our Michigan location, which is our newest one. The other thing about iterating and working with hardware is that you're always upgrading the hardware, so it's always changing, which is fun. Most of the time it's like, oh great, this works better, but then you're also troubleshooting whatever you learn from this new thing. So, lots of iterating, which we'll talk about later. This is the inside of one of those halves, so this is what we would call a cluster. This is 2 clusters. You can visually split that down the middle, and that's one and that's two. This is one of them, so the whole facility is 10 clusters. This is the shared workspace here, so they come in, you enter here, you suit up, walkthrough the curtain, put on a jumpsuit, hat, and work boots, wash your hands, and go into the facility. This is both for sanitation and food safety reasons, but really for pest management and disease management reasons. So, say this is basil. If this is the perfect environment for basil, it's also going to be the perfect environment for whatever predator basil has. So, we really try to be cautious. That is a huge thing that we've had to learn a lot about and we're pesticide free. Pesticide free pest management is a huge area of work for us, as a company. We use a lot of beneficial insects and cool climate things that thrips really hate because they're not good flyers, so we increase the air flow and that got rid of some of our threats. So anyway, we really tried to mitigate the pests with how we work and then we really clean these out because it was just like a huge operational cost for us. So, our design actually contributed to that. Then in the vein of food safety, something that I pushed for a lot is having your produce move one way in your facility. So, we harvest everything here, you would pack it out here on a table, and then it's going to exit through here in the cold storage. Additionally, our trash should be right out here. The compost goes through here and out to the compost area. It never goes through this decontamination area. So soiled or contaminated produce would not ever go into your clean room. You're able to really keep those processes separate. Also, a big thing for us is production planning. We used to have it where you harvest a little here a little there. That way if your pump was off, you still had basil in two other containers or something. We did change our production plans where you harvest an entire container in a day and so that way you can run sanitizers through the system. We also do what we call Mojave mode where we will heat the container up really hot to kill any pests that might be in there. Then we do a treatment process to breakdown any plant matter or pathogens that could be in there. That's also how we manage our systems to keep them clean, both for food safety and pest mitigation. When you're dealing with a lot of water, you have a lot of algae, and that's the weeding of the indoor farm. So, you're really trying to prevent buildup. That's also where pathogens can live, so having really good sanitation practices that aren't extra to your production schedule was really key when we were building them. So, iterating quickly, we work with a lot of engineers, which is really fun because I think we've all had the idea that we could build a better one of these and then we all got really busy. So, I have a team of people that I can work with there. I've mentioned this is a new industry so there is a lot of trial and error. I found that talking to friends, whether it be soil growers or hydroponic growers, I always learn a lot of really good stuff. I always try to stay in the know of what's happening in the industry. I try to have a really rich community around agriculture that's been really helpful for me in a lot of ways. We're constantly trying to improve these things. This again is our newest location. This is the inside. Like I mentioned, in the last two two years, our big focuses were pest management and food safety and figuring out how to design for food safety, manage for food safety, design for pest management and manage for pest management. In this, where do we fit into the food safety landscape? Urban, indoor, hydroponic, and hyperlocal would all be adjectives to describe us. But

how do you deal with pest management when you don't even really understand urban pest populations? Or what additional runoff is from sites that are near you or what your runoff is? You're much closer to your neighbors, so we really do have to do a lot of research and often extra work to figure out what government body we should be working with. Where do we fit into that, what can we do, and then how do we market that to our customers? This is the app. So, we have the hardware that we built in the container and then we built an app on top of it and we call that the farmer tool belt. In theory, it has all the things that you need as a farmer. So, it has instructions. It'll tell you like what you need to do and where in the container you need to harvest or where in the cluster. You can capture that data. We actually have images here, so I as a manager could go in and see man, all the seedlings looked really bad this week, what happened with the container? Then, we can like figure that out. We also have charts. So, we can analyze the environment, or the yields based off that. This is also a recapture of our pest data and our food safety data. Then we do use Google forms for that. So, just so you understand how the farm works a little bit, key things that crops care about are lights, I'd say light is the most important informer of growth that I've seen. We've used stronger or less strong lights and that's really changed our yield most dramatically, aside from changing the nutrients or the climates, really, are the lights. There are fancy light equations that you can run to figure out what different plants like. I'm not going to talk about those today, but just so you know, those exist. Then we manage the climate. So, we have the temperature, humidity, CO2, airflow, nutrients, electrical conductivity, pH, an aerator. The electrical conductivity is also referred to as EC, it is actually a proxy for nutrients. So, it won't measure your individual NPK's, but it will measure the overall nutrient ions. They have a charge, so there's this little probe and then water flows through it and it pulses, and it will count the ions, so this is how we measure our nutrients. All of these are in the zone, so we try to not really have a huge exchange with things that are indoor and outdoor just to keep it clean and to make it a microclimate within itself. These are some of our graphs that we use, so this is how we would turn things off and on. Here we can track and see if air conditioning is turning off and on correctly, like this one might say oh the air conditioning is working a little too hard, maybe we need to maintenance the condensate line and clean that out. That would tell us what type of maintenance you might need and what type of sanitation programs. Also, we can track the temperatures, any of those metrics that I mentioned here for the most part, some of them we like light we don't really track, but we can look at our metrics right here. I will say this helps my mental health a lot as a farmer because I'm not like oh are my plans getting watered. I know if my equipment is working for the most part, but then sometimes it makes it a little too available. You never really get to turn off because you're always there. So, there's a fine line between having this much information when you're farming. When you go in to work for the day, we give all of our workers tablets. So, we do try to provide technology for all of our workers. That's really important to us. So, you come in and you're like, oh, I'm going to seed in this container today and then I'm going to do a tank flush in this container. Green means it's done; blue means it's pending. This is how the farming app schedules everything and this is a log will look like. We log how much we harvest, what our compost was, if we had any bulk bags, how long it took and then how much you harvested. You can see who helped you with this? That would be listed here and then it will give you a heads up to make sure you fill out the information right. This is nervous Nelly. Nelly's a variety of chives so are our engineers made that little icon for us. This is because we're all moving really fast and sometimes information gets filled out wrong. So, we really try to build that into it and then food safety checklists will happen before and after this event. So, when you would go into your seeding, you would make sure to fill out a seeding food safety log. So, any sanitation that would be associated with that. So, it really is very natural to come into the farm, prep everything, and fill out your log. You know what you need to do, which really reduces the demands on managers, and it makes it really easy to train people. Farming can be heard, so we really designed with a farmer first mentality. If you haven't read this book, I think most farmers I know have at this point. It's a really easy read, but I recommend it all the time. We actually assign it as part of our curriculum or work development and it really helps our workers have a language to communicate with us for improvements because part of managing food safety is having a communication and feedback loop. We really tried to have everyone on the same page and have a similar language to communicate with people. I joke and say that everybody's cried about aphids in the walk in. We've all had those moments where everything is going wrong and are really stressed out and the plants are messed up and

we don't know why we feel helpless. We want to help young people with that troubleshooting a little bit and show them that they can make those changes on their own, can suggest those to managers, and they can work to have agency within the facility for their own improvements that they think are worth it. These are some tools that we made, so we actually 3D printed these, which is really cool. You can work with like online 3D fabricators for stuff, but this is what we used to translate the towers so we like stick this in and turn it. Before that we used to have to take the tower down, lay it down, take it apart, put all the plants in it. It was just a ton of labor, a ton of handling and a lot of taking wet things with living plants moving around, which is not good for your food safety, not good for your efficiency. So, the engineer who was actually a part of our first year of training, so he's been there for a long time, said he could build better tools. So, he built these. We call them our transplant keys. Also, they're made of just plastic so it's really easy at the end of the workday just to throw them in the sanitizer bucket. We did have some issues with root diseases at one point and so building those sanitation practices in where there's one communal sanitizer transplant key bucket. Then, everybody knew where we get them and wasn't popping in and out of containers, and asking where the transplant keys are, which did happen as well. Having people moving around and touching things spreads bugs. It's a lot. This is another farmer first technology design. This is a drop seeder. This is actually Gianna. I'm gonna play it really quick. We might not need to watch the whole thing. See the highlights. So, we wanted five basil seeds, so we measured the volume of five basil seeds. That sits on the top plate and gently scrape it across with a squeegee. We separate the squeegees to try to keep them clean. There's other squeegees that we use for those things. Once you kind of get it all the way across, you'll slide that top plate over and it will wind up with a hole on the bottom and it will drop right into your plugs. Our plugs are made of [inaudible] so they are also compostable. This took us from 21 man hours of seeding to 6 a week. So that opens up a lot more time for cleaning and for maintenance. On a hydroponic facility, in my experience, your time, is split 50/50 between working with the plants and working with the system, and so you really do need to open up time to maintenance your hardware, to clean it, to make sure it's working, to make sure your sensors are reading, make sure you can scout, and know what bugs you have. So, we try to build tools like this that make it easier to work on those more high-level things versus just putting [inaudible]. So, just some more philosophies too, I think we all as people and what I would consider modern farming movements, agree with this, we know that the food system is complicated, things get handled and there's a lot of areas for risk. We really try to reduce that so all of our produces is delivered within about 24 hours, maybe 48 of harvest, but really a really tight feedback loop there. We have a lot more control and also because everything is scheduled out in that tool belt that I showed you. Everything from the location of the towers we harvest to who worked in there is on the tool belt. We really have a lot of control over our produce. There's a QR code on the back of all of our produce so you can scan it and then it'll tell you who harvested it for you and you can go through the crops entire timeline. When we used to do demos, people would be like oh that's my farmer and that was really cool. We really try to create a lot of control and we give you localized production as a key part of having agency over our food and then providing that for our local communities versus this kind of large scale distribution system that we know can have risks. We delivered by E trike in our Brooklyn location too and so we do clean these. We do have maintenance better associated with these trikes that's done by our logistics team, which is three people, but they manage the very cool trikes in the city. This is a lot code that's on any item of produce and then you can see it there as well. That's our mission, to bring local real food people in cities around the world by empowering the next gen leaders in urban farming. This is our app that we use so I can switch to events to everything that we're gonna do today. This is Grand Rapids. Then I can give an environment snapshot, which I really like. It'll tell you all your readings and this red thing means that we turn them offline. A manager can do that from the computer. I can go into this zone and select this and that will turn it back online and that's because our humidity is not supposed to be at 23% and RPH is not supposed to be up by 5, so it'll send us updates if we turn that on. But the part that I want wanted to really show are these forms, so these are all Google forms totally free resource. If you have a tablet, computer, iPhone, smartphone, anything you can use this on your phone and I really recommend it, especially when sheets of paper can get wet and dirty when you're working outside. We can just click one. If you go to pre-event checklist, so this is the one they would do before any day at work, you would select what zone you're gonna work in that day, is everyone dressed appropriately, are there

any animals in the farm, any other types of contamination on the farm, and then what are you gonna do today? So, let's say you're going to harvest and you click next. Then here's all the items that you would need to do to be able to harvest. So, this goes into an Excel sheet and you can show that to your auditor. This has really reduced the need of having additional labor for your food safety, you don't have to have as much oversight of someone checking the logs and making sure everything is there. So we really, really like. Also notes, just teaching your workers to give you feedback about your system. I think a lot of farmers don't do that or maybe they like feel intimidated by that. I think it's hard as young farmers or new farmers to embrace feedback from disgruntled workers, but usually they're pretty valid in what they're trying to say and they want the farm to improve. I think that comes from a genuine place, so we try to collect a lot of notes. Then we also hold feedback sessions with the team, where we all sit together and talk about what's working and what's not. We do a little bit less of that now, but it was really helpful when when we did. I'll leave it here and then we can open it up for questions.

[26:22]

Maggie: Thank you. I for sure have some questions, but I wanted to open it up first to y'all to ask anything or bring up any topics.

[26:34]

Bre: I have a question, so actually being a student in New York City about food, I've actually gone to a quite a few farms and indoor farms. One was Farm One in Tribeca, and I was just interested in how this plays out because I remember visiting them and they talked about introducing beneficial insects into a controlled hydroponic environment. I was wondering if that's something that has been explored by you from a food safety perspective. That's something that is kind of just crazy and mental and they're doing it over there, and everyone's doing something else. If you could just expand on that a bit.

[27:12]

Sarah Ann: Yeah, so I would say beneficial release is really common now. I think it's more common in greenhouse and indoor because if you're releasing into a field, they just fly away. But I know it's pretty common in the greenhouse industry. People do really care about the pesticide content of their food, and so a lot of people are looking at organic or pesticide free as those shopping labels. So beneficials as far as like indoor specifically, there are some nuances. We know that bugs see a lot of things, especially on the light spectrum that we don't, and so when you use spectrum lighting, we use relatively full spectrum lighting, but if you're using spectrum lighting we don't really know how they respond to it. Some of our bugs we definitely will release them and then they just get confused and fall on the ground so we know this bug doesn't work in our system, so we use another one. The other thing too is you have to know a lot more about bugs for sure. So, the beetle, it's called an orias, we use that to release to treat adult thrips or to kill adult thrips. They go into diapause which is bug menopause below 13 hours of light. So, if we only have 12 hours on in our container then we know that those bugs won't be a good fit for us, so there definitely is a lot of research. Then the other thing is we're on walls, so figuring out how to release bugs on walls and not the ground has been another thing and we found a big way is just to really inoculate your seedlings really well with your beneficials, target the early growth of light or early area of growth and then that inoculates them to go in the tower. That's the key thing. We work with a company called Copart, who I highly recommend, they're so nice, and their technical experts really have improved our operation a lot. Industry standard is probably moving towards beneficial release and that works in tandem with scouting. So, you do have to know what bugs you have in your farm in order to release beneficial for them. For example, whiteflies between silver whiteflies and greenhouse whiteflies, two different parasitic Wasps are used to treat those, so Copart help me find a lot of those products and their technical reps will help you and the support is totally free. You just buy the products.

[29:35]

Bre: Yolanda, you had a question?

[29:35]

Yolanda: Yeah, so you mentioned run off and issues with your neighbors. I'm curious if you can expand on that a bit more.

[29:44]

Sarah Ann: Yeah, I wouldn't say that's been a huge problem. We haven't had complaints from the city or anything like that, but it is something we've tried to be conscious of. So, in the different designs, figuring out what our runoff output and what chemicals are in it? It's expensive to lay a ton of sewer pipes and so we are trying to be conscious of who's around, what type of drain it's going into, and is it a storm drain? Our Michigan facility is on the main water grid so we don't have as many concerns about it there. Luckily we use a lot less water and every environmental government person I've talked to about it, which has been many, say we're really not producing a ton of water compared to an outdoor farm, which is comforting, but we do try to think about the sustainability, and we have looked at recycling water programs and other hydroponic organizations in the city we could donate. Transferring that water is expensive, as waters heavy, so there's all these logistical challenges when you're thinking about your environmental outputs in urban environment. In New York in particular, there's the Gowanus Canal, which is really gross, and one of the reasons it is really gross is fertilizer runoff. So, we tried to mitigate that by using most of our fertilizer and then releasing the water when it's pretty low in fertilizer content. Then we also have looked at these donation programs as well.

[31:08]

Maggie: So, is it being recirculated?

[31:10]

Sarah Ann: Yeah, we recirculate it for the entire life cycle of the zone. We have sensors in it and we continue to treat it throughout the zone and throughout the duration as well. So, it's not just like it runs through system and runs back and we are able to use the reservoirs, which are about 100 gallons, or a little less in the cities, but we were able to use our reservoirs for quite some time.

[31:33]

Maggie: Do you have to do water testing of those reservoirs?

[31:38]

Sarah Ann: We do. So, we do both the food safety equalize central stereo water testing, and then we additionally do nutrient testing. We work with Jerry Peters for that and I think we work with the University of Pennsylvania for our food safety testing. I think that they do that, but I might be making that up. We do track the nutrients in our water. Typically, we do that more now when we were trying to refine a recipe to figure out if increasing the temperature helps them absorb more of something and so you can compare the nutrient content of the leaf tissue to the water and see if something is missing in the leaf, and then there's a buildup in the water. That means that you have an uptake issue. That could be your pH. That could be the humidity. Typically, we are doing deeper dives and do our climate recipes or other things that some we will do that more advanced nutritional testing.

[32:32]

Maggie: Are you using cool bots?

[32:34]

Sarah Ann: We are using cool bots. It's connected our AC. Those lights are hot and they're the only heat for the system and if AC wasn't on it would probably get to 140-150 degrees, which is not safe for plants or workers. So, the cool bot seem to work a little bit harder. Then also the whole farm is controlled by outlet, so the sensor is like oh the farm is 85 degrees, the farm is not supposed to get hotter than 85 degrees, the farms 86 now so I'm gonna turn on the AC. It will turn on that outlet that the cool bots plugged into.

[33:09]

Maggie: I was wondering basically just if that is what you were doing. The whole time you were speaking, because square roots is so tech heavy, I was just like where are any spots where there could be an applicable practice that you all are doing to farms that are growing in the ground?

[33:27]

Sarah Ann: I think I mentioned earlier, but I worked on soil farms for a long time before I worked here, so maybe we can talk about that for just one second. A big thing is just climate and air flow and honestly you can get little \$12.00 thermostats and humidistats and then stick them anywhere. They have a max and min, so I recommend just putting those in all places. If you got a problem, put it in your field. That's really gonna just give you a little bit more information about what's happening and I think that's really helpful. So we put one in there because this is a microclimate. This is a nursery. The sensor is here and that monitors our climate all the time, and so it's obviously not tracking what is down here in our nursery with our seedlings. So what is this problem relative to? What we found out was these guys are hot and humid from the lights and then the humidity is being trapped. So we just put in this PVC pipe with holes drilled into it and a little fan on the end and we just push that hot humid air out and you can pulse it. You don't even have to have it on all the time. So, you can get a little timer put in there. This would maybe, depending on the scale, take around \$60 to install and these fans are really good. I think they are maybe around \$120.00. They are called Air King, which is the brand. I really like them. I think they've been really easy to clean which I really like and they're really industrial. They've handled a lot of heat and humidity in our containers, so anything like that is really good and just testing your air circulation. I think it's helpful. I used to work in coop houses and its really kind of specialty [inaudible] production and you can set off smoke bombs, you can just buy them, party smoke bombs or whatever, and try to do it when there's no plants, but you can set that off and that will help you see your airflow in your container. So, we've done stuff like that too when we wanted to test our airflow because we calculate those with equations, but we want to validate that in practice. I'm not fancy enough to calculate that with an equation, but if you just want to understand a little bit more about your airflow, that's a great way. I think pest management is a huge thing which I kinda already talked about, but just helping your workers understand language to help you as a manager say hey this process can get more efficient or how can I help? A big one that I can speak to that is nutrient deficiencies or plant deficiencies. We taught the workers to identify any type of plant damage. We really taught the workers to identify that stuff a lot and that way they could come back to us and we don't have to be readily in the container to spot these issues. A lot of these tests that I've talked about our resources are actually relatively affordable. You know they're comparable to your soil test and the water testing or the tissue sampling so you can do that as well.

[39:39]

Maggie: You only touched on your worker training for a moment, but I feel like you said some really important things that I wanted to highlight. You just said something again, empowering your workers to be able to identify the issues and bring them up. You also mentioned having assigned reading to create a common language, which I also think is wildly important, and I've never heard expressed in exactly that way, but I think it's like what a lot of farmers are getting at. Then teaching them to offer feedback. That's huge. As a young professional, working in a nonprofit it's something that we talk about all the time and to.

[37:23]

Sarah Ann: And to take it with grace and make it constructive. Yeah, definitely. In my experience it took about five years of being a production worker before I felt ready to be manager, so that's anything from production planning to pest management to nutrient management, soil amendments, any of that. It really took a long time to learn and I'm really thankful for all the people that helped me. There are resources, I think the northeast is really good on this. So, this is called DACUM and I work a lot with Cornell. They have the whole small farms program that I love but they and other people have created things called DACUM, which stands for develop of curriculum. So, this is a curriculum for managing a crop rotation system and then you can go through here and it will show you how to do this and what a DACUM is. You have these



charts, so what's the goal of crop rotation? Even just breaking out what your expectations are of your workers is really helpful and then breaking out the responsibility levels. What's an entry level worker, what's a mid-level worker, what's an assistant manager? Whether you have two employees or 8 employees, I think that's really helpful is just spending some time designing and creating your job using things. It has been really helpful. So, it's like OK, reduce weed pressure. Who's gonna manage weeds on your farm or are you as the farm manager gonna spend all your time weeding? You probably want to because you wanna do it all, but that's not reasonable and you will burnout. So, you really need to think about that because your time as a manager is expensive and as you become a higher skilled worker your time becomes expensive as well. So, that goes with compensation. I try to think about these things a lot when I'm designing farm positions. Then I also think about how to how to train people to understand this type of stuff. DACUM is just one example of a material that does that. Another one that I use a lot is the dairy grazing apprenticeship. This is the only agricultural apprenticeship approved by the Department of Labor. As you go through this training, your skills will increase. So, say after six months you've completed X courses and X hours of training, therefore you get a \$2 pay bump because your skills have matched that. So, we try to think about that a lot. We bring people on and the carrot of motivation is a big part of success for us. How do we get people to do that? Yeah, we try to empower people as much as we can, and I look a lot at farmer training programs for that.

[39:55]

Maggie: How often do you do training with your employees?

[40:01]

Sarah Ann: Often. It depends. It's typically in the summer, so we're doing it now. We reassess the curriculum schedule for throughout the year, and we get feedback on last year, what worked, what didn't, what was expensive, what was hard. Then we structure when they're gonna do that. Now, we're building in more boot camp sessions and then evaluation sessions. So, it's like OK, you're gonna learn a certain set of skills really intensely for one month and then the next 2-3 months you're just going to practice those skills and have a manager evaluate you, give you feedback, make sure you're doing things right, and then after that you'll learn another set of skills. So, we're kind of breaking it up. Something we noticed last year is people learn at different paces and so we really wanted to build in this mastery portion or space to become very good at stuff. We've all seen a farm manager harvest things very quickly and being like how do you do that? We want people to get there before their troubleshooting hardware. It really happens all the time and I just focus on the farm training portions, but we also are trying to build in a lot more professional development. Questions like how are you doing with conflict resolution and that's really available for assistant managers. We do that as our most direct path from the production farmer to working in management. So, we try to prime people for that because the assistant manager will watch 2 farmers bicker about the right way to transplant so you know we try to give them the tools to navigate their responsibilities we're expecting them to deal with.

[41:35]

Yolanda: Just a comment, I have a greater appreciation for that management piece now. I was familiar with Omni's work and then you know it's interesting that with Cornell, there's all these different entities and organizations. Yeah, so I'm learning too, so this is great.

[41:52]

Sarah Ann: Great. Yeah, she was the one that directed me to the dairy, maybe it was Billy Mitchell, but she directed me to the dairy grazing apprenticeship and then she's been doing a DACUM on vertical farm operations management with me for the last, not just me, lots of other growers too, for the last year with agritecture as well so.

[42:11]

Maggie: Do we have any last questions?

[42:14]

Bre: Yeah I do, but I also feel like it's a can of worms. I think the technology aspect is so interesting. Do you think that by having at least some technology on different types of farms, soil based, aquaponics, hydroponics, that it would help with food safety as a whole and just keeping better track of your operation?

[42:37]

Sarah Ann: I think at just the minimum, whether it be software or hardware, technology can save you time, which can help you focus on maybe those other elements, but they also will support that type of stuff. If you can design your farm in a way that makes sense for people to move through, it's going to be a lot easier to keep track of. So, just from a traceability perspective that software can be helpful, whether it's like I know that I've named this greenhouse A so then when my workers come in they can say, oh, I know that all the arugula for market on Wednesday went to greenhouse A. So, just naming systems like that can be really helpful for your workers. You don't necessarily need software to do that, but I do think degrees of software can help you. I also know that a lot of farmers have concerns about their data and how their data is being used in a lot of the software companies are more small scale, so you might be able to beta test it and use it for a while, but then they might not get funding and you can lose that data or lose that work. We don't have a good way, I think, to create products that farmers really wanna use that feels super integrated and also feel holistic, because everyone seems really different. I like hardware technology I think a little bit more. I do love our software engineers, shout out to them for sure, but there's a really cool company called Terr Attack, and Johnny has all the slow tools, I think those are amazing. I think small hand machines or small scale equipment can save you a ton of time. Really, just the question that I keep asking is how expensive is my time and how much free time do I have? That's really hard because it's so easy to say I'm gonna work from sunup to sundown, but you gotta take time for yourself. You have to take care of yourself. So, figuring out what technology fits for your operation to save you time and if your priority is food safety, if you need to get in the vendor and you need Gap certification to do that, then try to find technology that's gonna save you time. If you hate writing food safety logs, try to find a thing that saves you time. You know, like you hate having workers sign a visitor log, give them an iPad and let him do that. It's really just asking where do I need more time and how do I build a system? Or is there a tool that can help me?

[44:46]

Maggie: Yeah, totally. Especially if you love lean farming too and you're just like where do I cut out this waste? You mentioned designing for cleanliness, which is often talked about in the PSA training as hygienic or sanitary design and I'm wondering about some of the tools that you use. So, you mentioned squeegees for specifically seeding, but what are some of the other things that you use to help keep things clean within the containers or zones?

[45:21]

Sarah Ann: Yeah, we call them zones but they are containers. I mean, I would say the biggest thing was moving between the first design of Brooklyn and then the second campus design of Michigan. The Brooklyn Design has a work table in all of the containers, so you're literally doing work in all the containers. Whereas the Grand Rapids design, you do very minimal work in the container. You transplant any purpose in the containers and you scout any check on it, but all the work is done outside the containers. That has not only has it created a more collaborative work environment (I was watching all the Grand Rapids farmers and I was like wow the stuff that you guys talk about is so different). In Brooklyn, everyone says so and so is transplanting faster and they won't do it my way, whereas in Grand Rapids they are altogether, so they're like, oh, how are you doing that so fast, I want to learn. It was so interesting it to see that. Creating designated areas for work, because that's gonna keep your tools very separate, it's going to keep you from running around, which is a big thing. Then that creates designated practices within that area, so you don't have a bunch of electrical equipment in your seeding area because it's the seeding area and you treat it like a seeding area. We harvest the whole container. That came from a fallow idea of letting something be fallow, letting

something be out of production, letting it rest, letting it renew, providing any care that it needs during that time. People want to say oh indoor farming, 52 harvests a year, easy. In theory, it's like that, but in practicality it's much more nuanced and you do have to be aware of the fact that stuff is alive and you have a limited amount of control with those things. So, you need to build times to rest it. Also training everybody on how to work with chemicals, like this is Santa date, this is how you read a SDS sheet and going through that with employees was really helpful because then they knew how to handle it. We don't have a ton of mixing on the site we try to provide just little doseatrons that are around \$50 from a global industrial. You can just punch them on the wall. They are not even electric, they are just mechanical. You can build in equipment like that so people don't have to fidget with things. I actually had a friend call me about a sanitation bond that she got in her eyes, didn't know what to do, and didn't want to ask her manager. I felt bad. You should never do that so. That that type of stuff is really big and really I think, helps workers be more confident when they are executing sanitation practices.

[47:52]

Maggie: You are a wealth of information, Sarah.

[47:56]

Sarah Ann: I love to help.

[47:59]

Maggie: Thank you, this was not typical of our focus groups. We definitely have had some more farmers, but I do think that because this is not something that I'm very familiar with, I was grateful to be able to ask questions in this case where I wasn't necessarily asking instead of a farmer participant. Thank you again for your time and I hope our paths continue to cross.

[48:24]

Sarah Ann: Thank you so much! Y'all have a great afternoon and the rest of your week.

[music]

[48:28]

Thanks for listening to our produce safety focus group series. For visuals from the presentations, more information on this series, and other produce safety resources, visit [youngfarmers.org/focusgroups](http://youngfarmers.org/focusgroups). This podcast was edited by Hannah Beal and recorded in partnership with the National Farmers Union Foundation over the summer of 2020 as part of our EFSA produce safety programming.

[49:07]

*Transcription by Mackenzie Jeter, National Farmers Union*