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SPEAKERS

Jamie, Dr. Cameron Jack, Amy

Jamie 00:07

Welcome to Two Bees in a Pod brought to you by the Honey Bee Research and Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance understanding of honey bees and beekeeping, grow the beekeeping community, and improve the health of honeybees everywhere. In this podcast, you'll hear research updates, beekeeping myths debunked and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program, and thank you for listening to Two Bees in a Pod. Hello, and welcome to another episode of Two Bees in a Pod. I'm your host, Jamie Ellis accompanied by co-host, Amy Vu.

Amy 00:47

Hello.

Jamie 00:49

Today's episode we think is an exciting one. We're going to be talking about the history of the honey bee research and extension laboratory here at the University of Florida. We plan to give an in depth view of the instruction programs that we offer at UF. And we are going to discuss honey bee colony health what does it mean to have a healthy honeybee colony? How do we know that we have arrived there? We will end this episode as we always end episodes with questions that we try to answer from viewers or listeners to our podcast. All right, so let's get going.

Amy 01:24

All right. So, Jamie, I'm always giving tours. We have public tours all the time here. And the first thing we do is we talk about the history of the lab and how this was built- how this facility was built. And it was just built last year, right?

Jamie 01:39

Yeah, absolutely. So the the new bee lab that we're sitting in right now while we do this podcast was actually opened in June of 2018. And so the story behind how I got there in the first place. That's actually a pretty good story and we owe a lot to beekeepers for making this happen.

Amy 01:54

Beekeepers throughout the state.

Jamie 01:57

Yeah, let me give it just a brief overview of the background. Essentially, six or so years ago a couple of beekeepers visited me, Laurence Cutts and Gordon Klaus, and they were talking to me about raising money for research equipment to support the research programs that we have here at the University of Florida. And I thought that was a good idea. But at the time, the lab space that I was in, in Steinmetz Hall, was small. And I kind of told them, look, guys, if you can find me more equipment, but what I really need is more space. And I kind of said that tongue-in-cheek thinking that wouldn't really catch on. Well, knowing Laurence and Gordon now I should have known better because that really caught on and they took that to the Florida State Beekeepers Association. And the idea of building a new bee lab on the University of Florida Campus just absolutely exploded. So it started just with a conversation and became a grassroots effort to build what we think is a premiere honey bee research and extension facility.

Amy 02:55

And that's pretty cool. I mean, it was just one of those things where the need was there.

Jamie 02:59

Yeah, it was. The story is I was hired at University of Florida in 2006, right? And when I was hired, I had a very big extension appointment. So most of my job was to interact with beekeepers for educational purposes. So I really, I always joke I was given a relatively small lab in the Entomology Department, because the idea is I wouldn't have to do much research, I was going to spend a lot of time with beekeepers. But our research program just grew. And so by the time I was having that conversation with Mr. Cutts and Mr. Klaus, you know, already had somewhere in the neighborhood of 30 people in the lab, postdocs, technicians, students, etc. We had a lot of research projects, our extension program was going, our instructional program was growing as well. And we just needed space. And so the need was there. And the beekeepers identified it and they just really gravitated towards this idea of building new lab.

Amy 03:51

Sure. So what did they do after that? How did you get in the process of building this lab and getting it approved things like?

Jamie 03:57

Well, I mean, obviously, the catch when building a lab, like the one that we're sitting in at the moment is these things aren't free. So to start you sort of from the beginning, we had some early dialogue with IFAS facility. So IFAS is the branch of the university, that Department of Entomology and Nematology is housed in and we met with Kevin Heineken here, who is the lead of IFAS facilities. And the idea was

we wanted to go to Kevin and say, Kevin, this is kind of the vision that we have for a bee lab. We know that you've managed other building projects on behalf of the University of Florida. So could you work with us to roughly design a building so we get an idea of the cost of the facility? So we were able to put together a rough schematic, a diagram of the building. We knew about what the square footage would be, around 10,000 square feet, and he told us it would cost about \$350 a square foot. So we were looking at something around 10,000 square feet, that would be somewhere in the neighborhood of three and a half million dollars. Well, where do we get that money? Right. And so the beekeepers quickly thought that perhaps they could go to the state and see if the state legislator and the governor could allocate money for that. And that's really where the process started.

Amy 05:08

All right, and it happened the first time around.

Jamie 05:11

Well, it's politics, nothing is easy in politics. So what happened is the Florida State Beekeepers Association, paid for an independent third-party review of what would the bee lab bring to the state in revenue because that's what politicians were already asking for: What's going to be the return on the investment if we build this bee lab? What's the state going to get out of it? What are beekeepers going to get out of it? And so what they did is they paid for this third-party review that suggests that if the bee lab were built, over the lifetime of the facility, there would be a return on investment about \$90 million. Well, that figure then was taken by the Florida State Beekeepers Association, to the state legislator, who, the first year, allocated two and a half million dollars. Now if you're following the story, right, this is a 10,000 square feet facility for \$3.5 million. But we were happy to get anything that passed the Florida House and the Senate, made it up to the governor's office. And it got a big whopping veto. The first year was demoralizing. Exactly. Yeah. Like whack-a-mole, right? I felt like we were the moles that got whacked in that game. But you know beekeepers, they don't really stop when they put their mind on something so they did it again they re-armed themselves, recalibrated the argument, went back to the legislator the next year, were allocated two and a half million dollars again, we knew it was going to sail through. But the second year we got whack-a-moled again. So they always say in politics third time's a charm. I was on sabbatical in Germany at the time, and I'd kind of given up but the beekeepers had said, we'll just try one more time, we'll see what happens. They had a state legislator down in Umatilla, Florida, who was really advocating for it, Senator Alan Hayes. And he said, let's do this one more time, I think I can get it through. And so that year, the beekeepers managed to get 2 million allocated from the state, as long as the University of Florida put in 500,000. And the beekeepers raised 200,000. So it's kind of this matching deal. So we held our, we crossed our fingers, held our breath, while that made it to the governor's desk. And he didn't veto it. So it made it through. But if you do a little bit of math, the state gave 2 million, University of Florida was on the hook for 500,000. And the Beekeepers had to raise 200,000. That's still only 2.7 million of a building that three years earlier, we had guessed would cost three and a half million dollars. So we were short on money.

Amy 07:48

And then what happened?

Jamie 07:49

Well, I knew you wanted to know. I was waiting for you to ask that very question. So then the beekeepers, through the Florida State Beekeepers Association, said we're going to make this happen. The very first day that the money could be drawn down from the state, a commercial beekeeper David Mendez, donated \$200,000 towards the effort. And right off the bat, we had already met our match. However, that's not \$3.5 million. So the Florida State Beekeepers Association put together a fundraising committee who just went berserk. They went out there and beat the bushes. And we had hobbyist beekeepers, corporations, sideline beekeepers, commercial beekeepers, individuals simply interested in bees, local bee clubs, state bee clubs donating money. And very quickly, we got above three and a half million dollars to build the facility. But the catch was is we're three years later, everything costs more. So the University of Florida allowed us to move forward. And essentially what we did is we designed the first building University of Florida said, well, we need to assume we're not going to get any more money, I want you to go ahead and put in this first building everything that you think you need. And so the first building was designed and while the first building was designed this 8500 square foot facility. The beekeepers continued to fundraise and so we were able to build a second building that's somewhere in the neighborhood of 6500 square feet. And from there, we even got a teaching pavilion that's somewhere in the neighborhood of 1000 square feet. So once you put all of it together, we have now over 16,000 square feet of space, all paid for by the state legislator, the University of Florida, and lots and lots of beekeepers who really bought into this effort.

Amy 09:44

I remember during that time, I was an extension agent in Orange County, and we were working with the local beekeepers association. I just remember every single meeting we were trying to pitch the idea of having this state-of-the-art facility here at the University of Florida. And it was only a couple hours away.

Jamie 10:04

Amy, I was blown away, every time I would go speak somewhere, beekeepers were just - it was almost like I was at a church and someone was passing the offering plate around. I mean, people were just donating. I mean, they were giving \$1, they were giving cents, they were giving hundreds of dollars, 1000s of dollars. We even had half a million dollar donation. And just, it became the thing that beekeepers in Florida rallied behind. Now, this, of course, is not just a Florida podcast. It's funny, we build this facility here. But it now makes it possible for us to reach beekeepers everywhere. I mean, this podcast is an example, we now have the ability, the infrastructure necessary to put together a resource that's now useful to beekeepers everywhere. And I mean, I'm humbled, the beekeepers did this for us, amazed at their effort. And I really think it was visionary, because I think that this facility is going to allow us to house an amazing team moving forward, who could help us reach all of our instruction, extension and research goals even more, and I think it's a great partnership. The University of Florida kind of touts this as a classic private-public partnership, private individuals, the public coming together, recognizing a need the need being bee losses, bee-related issues, and now coming together to build a bee lab. That's just the beginning of something really amazing here.

Amy 11:25

Yeah. And I think that's an amazing example of just exactly what the land grant system is here for. But just real quickly, we do have tours. So can you just tell us about what people would see when they come here?

Jamie 11:37

Yeah, of course. So we're a land grant institution, we have responsibilities and research, teaching, and instruction. So when we design this 16,000-plus square foot facility we wanted to make sure there was space for all of those things. So we've got teaching classroom, we've got a very large research lab, and accompanying rooms that support the research. We have what I happen to think is the world's coolest observation hive room. We can accommodate 12 observation hives, it's red-lit, it's climate controlled. It's just a perfect place to study behavior. We have a wonderful break room, great offices, and lots of meeting space. We have a teaching apiary behind the building. We have research colonies behind the building that make it possible for us to do research here. We even have a Support Facility the Amy E. Lohman Apiculture Center, which is composed of a state-of-the-art honey extraction and processing facility, a beekeeping museum, some office space, and even a beekeeping workshop. We even have the Gordon Klaus teaching pavilion out back where we can accommodate 150 beekeepers. If that weren't enough, the entire bee campus as it were, is landscaped in pollinator gardens that of course attract pollinators and in the backyard attract honey bees specifically. And if that wasn't even enough, we happen to be by Steinmetz Hall, which is home of the University of Florida entomology and nematology department, which is currently ranked the number one entomology and nematology department on planet Earth. So we have this and we have our colleagues at the USDA, just east of us half a mile and our colleagues at the Florida Department of Ag just west of us half a mile. We just have great colleagues, great resources, great campus. And it's exciting. You come on a tour here, and you really feel like you're in the center of entomological science.

Amy 13:22

And that's great. And there we have it folks that's the history of the lab. I think it's a pretty cool story.

Jamie 13:27

I'm so grateful to the beekeepers and I can't wait to see what kind of comes out of this effort.

Amy 13:35

For more information about this podcast, check out our website at UFhoneybee.com.

Jamie 13:41

The University of Florida where we are recording this podcast is a land grant institution. That means we have responsibilities in research, extension, and instruction. And we're going to take the next few podcasts to introduce you to these three branches of a land grant institution. So we have here with us our apiculture lecturer extraordinaire Cameron Jack, who's joining us to talk about instruction here at the University of Florida. Hello, Cameron.

Dr. Cameron Jack 14:09

Hello, glad to be here.

Jamie 14:10

And as an introduction to this segment, I just want to say the purpose of research is to take a problem for which there currently is no answer, to do an experiment, and to determine the answer for that. The purpose of extension, right, is to carry information to the masses and to get those masses to change behavior, and hopefully, ultimately lead to some sort of environmental or social change. So Cameron, what is instruction? If it's not just simply teaching students, what are we actually trying to do with those students?

Dr. Cameron Jack 14:42

Yeah, I think maybe the more traditional thought of teaching is just you're giving these students a ton of knowledge, you're throwing information at them. And that's not necessarily what our goal is. Teaching, instruction. I mean, we want to give them knowledge, we want to give them the tools to be successful. But ultimately, we want them to be proficient, in whatever we're talking about, or whatever the subject matter is. So if we're talking beekeeping, we're hoping that people don't just learn kind of the warm and fuzzies of what beekeeping is, we want them to actually go out and be successful at beekeeping.

Jamie 15:21

I love that idea of proficient, we're not just teaching for you to tick a box, like, it's your responsibility to teach at the University of Florida, you're not just trying to tick a box, I've taught a class, I've done it. Students aren't just trying to tick a box, I've taken three credit hours, I've needed these three credit hours in this Gen Ed course or whatever. You are really wanting them to change, you are wanting them to have the tools necessary to succeed. And of course, if they choose genetics or nursing or something else, you want something that they've picked up in your class to carry over into that profession. I like that.

Dr. Cameron Jack 15:54

Exactly, I mean, I'm also not maybe naive enough to expect that we're going to have just a huge army of beekeepers that are going to come out of this program and go into the industry and all be commercial beekeepers, that's not really what the thought is because most of them are going to be in different majors. Sure. I mean, they're not necessarily even in entomology. In fact, throughout most of the courses, most of them are not in entomology.

Jamie 16:20

We welcome even English majors.

Dr. Cameron Jack 16:21

Even English.

Jamie 16:23

Or the occasional art student.

Dr. Cameron Jack 16:25

Yes, exactly. But we have just a wide range of students coming from all sorts of areas but hopefully, they are learning some specific techniques, even if it's just like learning how to read a paper, a scientific

paper and be able to digest it and find, maybe some of the flaws or whatever it is, to be able to apply that and that can be useful for really any major, any education.

Amy 16:54

Yeah. So what - do you want to talk to us about some of the classes that you're offering?

Dr. Cameron Jack 16:57

Yeah, definitely. So right now I've been here for a year and a half. Well, when I got here we had just a course called beekeeping, which really covered just about every topic in beekeeping, just loosely. And then we had a practical beekeeping class, which was a hands-on version so you can actually - the students, I mean, you build the equipment, you give them the bees, and they get the hands-on learning experience. Since we've been here, I've tried to develop a few more courses. We've kind of taken the original beekeeping class and split it into two parts because I mean to try to cram a whole agricultural commodity into one single course just means that we were just scratching the surface,

Jamie 17:44

Not just the whole agriculture commodity, the most important agricultural commodity that exists.

Dr. Cameron Jack 17:48

Exactly and so we have a Beekeeping 1 class, the Beekeeping 2 class, they're both taught online so they are accessible to students from really around the world.

Jamie 17:59

So that means our listeners can even take these courses.

Dr. Cameron Jack 18:00

You can definitely take this course and I will be happy to be your professor.

Jamie 18:06

That's good. So you've got a Beekeeping 1 course, a Beekeeping 2 course, a Practical Beekeeping course, what else currently exists?

Dr. Cameron Jack 18:12

Right now we have another course that's an in-person course, that is really actually quite unique. We call it, we label it as a CURE course. So CURE course-based undergraduate research experience, so this course is actually not necessarily about honey bees and beekeeping. It's really about how to conduct research and how to do science and we use honey bees as a model and answer honey bee health-related questions as a class but it's kind of its own unique thing that's kind of a little bit out of the realm of beekeeping, but it's also super, it's been a really rewarding experience.

Jamie 18:47

So you've talked about four courses that currently exist, but you've got another one I know in development and some additional ones after that, so you can tell us what's around the corner?

Dr. Cameron Jack 18:55

Yep. This summer, summer 2020. We're going to - I've developed a couple of Study Abroad courses. So we'll go into Thailand, we'll have one course that's about the honey bees of Asia that'll be about the different species of honeybees. The other course is called beekeeping in Asia and it is kind of the differences between the management styles, of what's done in the United States versus in Asia.

Jamie 19:25

So let me get this straight students here at University of Florida can travel with you to Thailand and get two courses: one - honey bee, beekeeping in Asia and the other - something about honey bee species, right? The ones that are there in Thailand? And they can spend weeks in Thailand with you learning everything there is to know about beekeeping and bees species there. It's going to be it's going to be a beautiful thing.

Amy 19:46

Wait Cameron, Does that mean the students get to watch you like climb trees and like go into the forest and like pull -

Jamie 19:52

With certainty. But that's - okay, so four exist, two more on the horizon, right? The two in Asia. So what else?

Dr. Cameron Jack 19:59

We are planning a honey bee biology course, which will really get into all the nitty gritty of the fascinating world of honey bees. It'll be really interesting. And we're also planning on making a commercial beekeeping course, something that is really much more practical about how to run a business. Not just about all the beekeeping and the biology that does kind of serve as the foundation for this course, I admit, I'll be the first one to tell you, I'm not a commercial beekeeper. I don't know everything about commercial beekeeping. What I'm really hoping to do is to partner with commercial beekeepers, and have them come in as guest lecturers and teach a course like that. And I would like to develop that as an online course as well, so it's available for more students.

Jamie 20:48

Yeah, I think that's great, the idea of using commercial beekeepers who've been there done that as your instructors. And so on top of that, there have been rumors of a commercial beekeeping internship where students can carry on still.

Dr. Cameron Jack 21:00

Yeah, and that's what I would really kind of consider as that kind of Capstone piece would be an internship, that's kind of how it works in other agricultural education settings, right, you do a number of courses, then you go do an internship, and then you go into that industry. Well, that's what I would want to do for beekeeping is help students pair up with commercial beekeepers around the country, or really around the world, wherever they're located. And so they can actually get that hands-on experience.

Jamie 21:31

So folks, I mean, obviously, we know a mess load about the courses here taught at the University of Florida, but lots of other institutions offer beekeeping-related courses taught by a number of great faculty members. So you could always check your local area to see if there are courses that you can take. But you know, circling the wagons back here to the University of Florida, you know, you use the word students a lot, right? So you talked about what instruction is, you're teaching, and you're talking now about the courses that we offer here at the University of Florida, I mentioned that similar courses may exist elsewhere, perhaps not the volume of courses, but certainly similar courses. What is a student? What types of students show up at universities?

Dr. Cameron Jack 22:11

All different types of students will show. Yeah, after I asked that question, I listened to myself. I said, Yeah, of course, there's lots. But it's been really interesting, kind of we joked at the beginning. They're coming from all sorts of majors and all sorts of backgrounds. They're not necessarily young college students. I mean, we have retired folks that are coming in and still taking some of these online and in-person courses. And I actually welcome that. I love that because we will have one or two retired folks that have been beekeeping for a number of years, and they're able to kind of answer more questions or work with students in a different way that I might have been able to when I'm trying to manage a whole classroom. So a student is somebody who's there who's wanting to learn a particular skill. So it can be really anybody.

Jamie 23:02

And there's kind of two types, right? There's undergraduate and graduate students, undergraduate students who are ones who are typically pursuing an undergraduate degree, or an associate's degree, or bachelor's degree, those usually come with majors in our case, entomology, but Dairy Science, all kinds of other things. And so when many people think about college students, that's really what they're thinking about. They're thinking about their undergraduate degree where people are just sitting in classes and labs, and of course, your programming and other similar programs around the country cater to undergraduates. But in the bee world, there's also a great need for graduate students, and graduate students are those individuals who are trying to get advanced degrees. In our world, that's the master's degree, which usually takes two to three years, and/or a PhD, which is somewhere in the neighborhood of three to five years. And these are advanced degrees. There are courses that graduate students have to take that tend to be advanced courses, graduate related courses in our field, that might be insect physiology, it might be advanced beekeeping, things like that. But in addition to doing coursework, they're also doing research projects. And they are asking questions that they are trying to answer experimentally. And by the time they're done here, they've got masters or PhDs and are able to go on and have industry jobs or be scientists themselves.

Dr. Cameron Jack 24:10

And in addition to undergraduate students and graduate students, there's also another kind of branch of students that's really common at the University of Florida, that's certificate students. So those are students that are taking a certain number of courses, generally speaking, that's about five courses that will still allow you to walk away with a degree with a piece of paper that says, you've completed this and you've received this kind of training. And so that's actually something that is on the horizon as well. We want to take these different courses that we're developing and develop a beekeeping Certificate

Program. So beekeepers, really from around the world will be able to take some of these, at least the online versions of these courses and be able to get some additional training. I know there's a big argument that might be that well, what can you really learn from an online course? If you're not getting the hands-on bit, but what we at least hope to do is provide that foundation work. And then that's where the internship kind of comes in and you get those hands-on experiences after you've already built a foundation on the theory and the biology.

Jamie 25:17

So beekeepers out there, I want you to hear essentially what Cameron just said his certificate program is essentially exportable outside the University of Florida, you don't have to come here and get a degree. Instead, you can get a certificate in beekeeping and take the courses that Cameron's developed. And think about it this way. A lot of our pest control industries in the state of Florida have pest control employees who they hope to be trained through university courses, they'll pay for their certificate program. Well, this is pretty similar in structure. And of course, it doesn't substitute for the hands on that they would get by actually working with beekeepers. But it certainly provides foundational fundamental knowledge to bees and beekeeping. That would be of great value really to anyone working bees.

Amy 25:58

Now, Cameron, when you're talking about the certificate program, are the people that are going to be signing up for this, do they have to be enrolled as a student?

Dr. Cameron Jack 26:05

No, not necessarily. What they'll need to do, I mean, they will be a UF student, but they don't have to do an undergraduate certificate program, you just have to show a high school diploma or GED you don't have to go through all the hoops. And even if for the graduate certificate program, you wouldn't necessarily need to do the GRE or those The Graduate Record Exam or maybe some of those other qualifiers that you would need. It's really meant to come in, get training, and it's available for more students.

Jamie 26:37

Well, I love this, Cameron, thank you so much for joining us, it really makes me want to be young again, and be a student, again, all these courses you're offering at the university. Yeah. Appreciate that. And for more information, if you're listening for more information, you can look at our podcast notes and see the courses that Cameron offers and links to some of the things that he's doing. It's great. Thank you so much.

Dr. Cameron Jack 26:55

Thanks for letting me be here. For additional resources, visit the podcast page on our website, Ufhoneybee.com.

Amy 27:05

Welcome back. We are going to talk a little bit about honey bee colony health in this segment. I keep seeing it, I keep reading it, I keep hearing about honey bee colony health and you know the one thing

that beekeepers do when they they see each other: "Hey, how are your colonies?" So Jamie, do you want to talk to me about honey bee colony health and what that actually means?

Jamie 27:24

Yeah, Amy, I think this is an incredibly important topic. And it's funny, because if you were to ask Jamie 20 years ago, what do you think a healthy colony is? I'd be able to give it to you just really quickly. But these days, I have come to appreciate how complicated of a topic that is. And so in this segment, I think by the time we get to the end of it beekeepers or our listeners are going to say yeah, this is complex. I've not thought about it from that perspective. So let me just frame it this way. In 2006, is when we started seeing what a lot of beekeepers considered elevated colony losses that produced what we call colony collapse disorder at the time. And that morphed further into what we now call colony losses. That event led to a lot of scientific meetings that I and others attended. And what's funny is that a lot of these meetings, we talk about things that are killing colonies Varroa, Nosema, nutrition stresses, queen issues, all of these things. And then we pause to say, okay, but if a colony doesn't have Varroa? How should it look? And what we discovered is that we were struggling, trying to understand the way a colony should look, what is a healthy colony, what actually are beekeepers managing towards, we talked about management, well, management's not directionless, you're not just keeping things alive, you're trying to manage towards a goal. So we struggled with that concept. And I don't know, five or six years ago, I was at a meeting where this was such a hot topic, that some colleagues were going to put together a manuscript that defines: this is a healthy colony. This is what scientists are measuring towards in our research. This is what beekeepers should be managing towards and it was complex.

Amy 29:16

Yeah, it's basically not my colony is about to die.

Jamie 29:21

Yeah, I want you to think about it from a very practical perspective. Take a random colony from some apiary in United States. That colony is nearly guaranteed to have Varroa. Alright, so in my mind, I'm healthy because I don't have the flu, and I don't have a cold, and I don't have sinus issues right now and everything's working, right? Well, colonies always have Varroa, so by default, our colonies always not healthy. You know, most colonies have Nosema at least many of them do. Most colonies have deformed wing virus. If you're in the southern US and parts of the world. Most colonies have small hive beetles, so you know, this is a sad way to state it, but I almost feel as if most colonies are sitting on this seesaw teetering towards not being healthy, and our management is saving them from death. I know that's a scary way to think about it. But think about if we don't put management inputs to colonies, whatever diseases or pests or nutritional stresses, etc, they are carrying, will win. So I almost feel like all colonies are teetering on being not healthy. If it were not for our management intervention. That's kind of a scary thought. If you think about it, failure to address colony needs mean that our colonies are going to suffer.

Amy 30:43

And it's scary, because we don't really know what that threshold is, right? With all those factors combined together. But you know, when you're talking to a beekeeper, let's say someone asks you about colony health, what would you say when you're looking at the outside, a lot of people say, when

I'm looking at the outside of a hive, I just look to see if the bees are coming in and out. And that's good enough for me.

Jamie 31:03

Well, I'm going to start even a step earlier. I'm going to tell you that every beekeeper should start with at least three colonies, because to me defining colony health starts with being able to make comparisons. If you have one colony, you could really never know if your colony's healthy. So by the time this conversation is over, we're going to say that health means that our bees are growing, are appropriate, they're doing what they should do that time of year and they're productive. Alright, well, how can you know what normal is, if you don't have other colonies to which you can compare a given colony. So from the outside in, let's say I'm a hobbyist, I need at least three colonies, if I'm a commercial beekeeper have 1000, this is really kind of a non-issue, but from the outside moving in, is colony A foraging the same way at the same rate, and for the same thing, that colonies B, C, D and so on, are foraging. If there's a bee beard on colonies 1, 5, and 6, is there a bee beard on colony 2? If there are small piles of dead bees on the outside of colony 6, are there small piles of dead bees on the outside? In other words, is what I'm seeing for this colony at this time of year under these conditions, consistent with what I'm seeing at colonies that are neighboring it, and so from the outside, that's what I want to see if my colonies are foraging similarly, if they are, are they collecting the same things? How do you know what you can see? Pollen as an example? So is a colony doing what other colonies are doing that time of year?

Amy 32:41

Sure. And when you talk about pollen coming in, does that necessarily mean that nectar is also coming?

Jamie 32:47

Absolutely not. There can be a lot of pollen plants available in the absence of nectar at that time of year. So you will see a lot of bees collecting pollen certain times we call it nectar-limited pollen flows. There's also pollen limited nectar flows, which is the other way around, but just because they're bringing in pollen doesn't mean they have all the carbohydrates they need to survive.

Amy 33:07

Sure. So they need those carbohydrates. They're also feeding, they're eating, they're feeding their brood, they're feeding their little babies. So when you're looking inside a hive in the colony, what are you actually looking for?

Jamie 33:21

Again, think comparison, right? So I'm inside this colony, or I've opened this hive, I'm looking at this colony. Is this colony similar to the colonies I've just worked? Is the population similar? Do I see evidence of disease? Do I see Varroa? Do I see deformed wings? If I see that I instantly know the colony is not healthy. It can't be because it's got the world's number one biological threat working on it. Do I see pollen stores in this colony consistent with pollen stores that I saw in other colonies? Do I see honey resources in this colony that I see consistent? Is it free of visible signs of disease? Do I see chalk brood, etc? Now here's a kicker? What if all colonies are equally diseased? And you're saying this

colony looks normal? Because it looks like other colonies? Well, that by itself is not safe. So really beekeepers need to know what colonies should be doing. Given the resources available in the environment, given the time of year.

Amy 34:21

Sure and this depends on the location of where you are throughout the world.

Jamie 34:33

Absolutely. I mean, think about it. If you're in Florida in fall, I'd expect to see a little bit of pollen coming in and maybe queen starting to slow down a little bit. But if I'm in New York in fall, I'm expecting queens to be completely shut down and colonies to be clustering. If I'm in New Hampshire in April I would expect colonies to be growing so, that's the struggle with the healthy colony concept, is because you're not managing to 40,000 bees and that's where you want to be, you're not managing to 20 frames of honey, and that's where you want to be. You're not managing to the complete absence of Varroa, you're managing to what you consider to be an ideal for the standard colony, assuming no problems that time of year. It's a little tricky.

Amy 35:16

Yeah. So what sort of stressors would you say or what, different sort of factors, would you say come into play?

Jamie 35:22

Well, you're going to hear this throughout the life of this podcast, right. And the thing that beekeepers identify and we see this a lot, as evidenced by the Bee Informed Partnership surveys that we read. You're going to see beekeepers identifying common stressors, Varroa. If we only made a comment or a podcast about Varroa, we would have enough to talk about. That is a principal biological killer of honey bees, Varroa and the pathogens they carry. Most notably deformed wing virus. If beekeepers aren't managing their Varroa, their bees are going to die. So what else did beekeepers say? Well, they say nutrition, so carbohydrate management, right? And pollen management. And they also say queen quality issues, is my colony being led by a queen who is producing robust amounts of workers and are those workers doing what they're supposed to do. And then there's some kind of second tier stressors, Nosema, perhaps small hive beetle, the foul broods, pesticides, things like that. But really those big three: nutrition, Varroa, and queen issues are the things that beekeepers have to worry about. Managing those, assuming all else being equal, managing those three things, is a step towards tilting those colonies back in favor of being healthy, rather than being on the brink of significant stress and perhaps even a crash.

Amy 36:36

Yeah, and that's kind of the beauty of this podcast, right? So we're going to be able to bring in researchers, different specialists on these stressors. And these people are just working full time on just the smallest factors within a bigger picture, right?

Jamie 36:51

Yeah, that's exactly what I would tell listeners. Listeners, this is the second episode, don't give up on us. We're going to go into so much detail on these stressors and even more, and management related issues, and even more, but before we get too far away from what is a healthy colony, I want to illustrate how difficult it is to come up with a definition. I want to invite, Amy, our listeners to go to our Facebook page @UFhoneybeelab. And I want you, listeners, to just jot us a note in its purest, simplest form. How do you define a healthy honey bee colony? We'd love to hear from you and we get some comments back from you. We'll read some on the air, especially the ones we like and that might help us shape how we think colonies are healthy. And in the future, we'll be bringing in some commercial beekeepers to discuss this very topic with, so you can see how they define healthy honey bee colonies.

Amy 37:43

And there we have it. We don't have a defined definition.

Jamie 37:48

We'll get there.

Amy 37:48

But we will get there. And now it's time for our question and answer. I've got three Q's. Jamie, you've got three A's?

Jamie 38:02

Well, I will have some sort of answer.

Amy 38:06

Right.

Jamie 38:06

I don't know if I've got the answer. But I'll definitely take a shot at it.

Amy 38:09

Just make stuff up.

Jamie 38:12

We'll edit in the truth later. That's the beauty of podcasts.

Amy 38:14

So all of our questions have come from our social media, primarily Facebook. So if you do have questions, don't forget to go ahead and comment on any of our posts and we'll pull it in to our podcast. We'll just go ahead and let me ask you about ants.

Jamie 38:29

Yeah, what about them?

Amy 38:30

Do you like them?

Jamie 38:33

I love ants. I'm an entomologist, though, right? So you've got to be careful who you ask that question. Yeah, we get questions about ants all the time. I have a wonderful colleague who works for University of Florida and he is at the Fort Lauderdale Research and Education Center. His name is Dr. Bill Kern, and he knows everything about everything.

Amy 38:52

Oh, Bill, I can't wait to bring him in.

Jamie 38:53

Yeah, Bill's great. We ought to have had him on the segment for this because anytime I have ant related questions, I always send them to Bill because Bill is the knowledgeable ant man. So Bill wrote a fantastic document about ant control in the apiary. So just as a brief background, the University of Florida requires its specialists to write documents that we post online on given topics. And the University of Florida calls these documents EDIS documents. EDIS. That's electronic data information source. So Bill wrote an EDIS document on ant control in the apiary and in that document he outlines the common ants that are problems for bee colonies. Lets you know that there's two kinds of big breaks in the ants. There's the brood and bee eaters, and the honey and nectar stealers, and the reason that's important is because both groups of ants need control strategies that are unique to that group. You're not going to use a honey nectar strategy to control the bee and brood eater ants, because they don't eat honey and nectar. I really like one of the quotes that Bill has in his document about controlling these ants. He says carnivorous and scavenger ants, like big headed fire and carpenter ants, prefer proteins and fats and oils, while sugar loving ants like ghost, white footed and Argentine ants, readily go to sugar based baits. So it really helps to have your ant ID who is the ant that's attacking your bees, and that will tell you what type of bait to use. In addition to baits to control the ants, there are exclusion techniques where you simply keep the ants away from or out of the hive altogether. And Bill goes into great detail in this EDIS document about how you can set up moats around colonies. Or you can put colonies on stands, where the legs go down and the containers that have soapy water, etc. So, you know, I could describe every ant species and every ant control strategy. But I think it's a great idea to look at EDIS document that Dr. Kern wrote on ants. Audience if you're listening, you can find that by googling EDIS. Again, that's EDIS ant control in apiaries, or you can look at the notes and resources section for today's podcast to find a link to this EDIS document. Yeah, it sounds like Bill is really better than the Marvel Ant Man. He's the man that's for sure. I almost said for shizzle. But that would be really embarrassing, right? He's the ant man for sure.

Amy 41:36

Alright, so the second question we have; we actually have a visiting scholar here from Thailand, and he was doing some research and he is here just working effortlessly. I see him all the time. And he's here on weekends. He's here at night.

Jamie 41:49

I love people dedicated to advancing science and stamping out ignorance. I love those kinds of students.

Amy 41:56

So he had a study where he was really he's looking at at nosema, nosema spores and looking at propolis. And then, he found that there are some worker bees laying eggs.

Jamie 42:11

Yeah.

Amy 42:12

Does that happen?

Jamie 42:12

Yeah, of course it happens. Workers are females, right? Now, here's the deal; in a standard colony a queen honey bee's producing pheromones, that cause worker's ovaries to remain undeveloped. Now workers and queens are both females, but workers have essentially forfeited the right to reproduce. So in a normal functioning colony with the queen present, the bees can determine she's present because they can smell her, and those pheromones will suppress ovary development. But when a colony loses its queen for whatever reason, she dies, she's maimed, etc. If they fail to produce their own queen, some workers ovaries will develop in the absence of those queen pheromones and those workers will begin to lay eggs. Now laying workers cannot mate. Therefore, they can only produce unfertilized eggs. And of course, in the honey bee world, that means those unfertilized eggs will be drones. So a colony that is now headed by laying worker is only capable of producing drones, it will die. So you can dissect laying workers, and find that their ovaries are starting to develop, you can see the eggs developing in those ovaries. But that's essentially meaningless so why do laying workers develop in the first place? Well, scientists believe it's the colonies last ditch attempt to get its genes out before it dies. It's hopelessly queenless. There's nothing one can do to solve that problem, at least in a natural system. There are management techniques you can use to solve that problem. But a natural system, there's nothing that colony can do to fix that. So basically, the worker bees are just kicking out lots and lots and lots of eggs in an effort to get their DNA out there before the colony cashes in its chips.

Amy 43:57

That is pretty cool.

Jamie 43:59

Yeah, it is neat. But it's a struggle because when workers ovaries develop, they produce queen like pheromones. So it's hard to solve the problem. Because as you feed queens to that colony, they think they've got a queen and they just kill those queens. So it's a management nightmare, but a biological just amazing phenomenon.

Amy 44:19

I heard when you go and just kind of dump them off somewhere.

Jamie 44:22

Yeah, a lot of beekeepers will actually dump laying worker colonies off. The premise is that they think the workers are too heavy to fly so they'll never make it back to the hive. A much better way to requeen laying worker colonies is to actually use a queen nuc that you drop into that laying worker colony, and that queen nuc essentially bullies out those laying workers, and their own queen, the queen that accompanied the nuc into the full-size colony, takes over as the reigning matriarch.

Amy 44:48

Sure. And speaking of queens, this kind of heads us into the third question that I have for you as far as Africanized bees, we have Africanized bees here?

Jamie 44:59

Yeah, so we do and African bees are one of those tricky topics. And it's hard for me to talk about it without giving a very brief biogeography history. There are nine species of honey bees on the planet. And one of those occurs naturally in Europe, the Middle East, and Africa. And that's the bee that we keep, it's *Apis mellifera*. This one bee, has subspecies in Europe, subspecies in the Middle East, and subspecies in Africa. So the African bee the one you referenced is one of somewhere in the neighborhood of 25 to 30 subspecies of this *Apis mellifera*.

Amy 45:34

Should we be scared of having them?

Jamie 45:36

Yeah, so what happened is, the European subspecies that were imported into North America were taken into Central and South America. And these temperate raised subspecies didn't do a good job at honey production in these tropical/ subtropical climates so a scientist went over from Brazil to South Africa and other countries in Africa, sampled bees there and brought back with him, one of the subspecies. Now one of the things that is common among a lot of African subspecies of bees is they're very defensive. So you asked, should we be scared of them? Now, beekeepers should not be scared of them, we can manage them. But we need to be conscious of the fact that these bees can be defensive, they're easily provoked. So they've found their way into Florida, they're in the southwestern United States. They're in southern Florida so for us and for other parts of the US. beekeepers really shouldn't be keeping these bees because they can provide - they can be a problem for their neighbors, for livestock, etc. So I tell people not to be scared. They need to be aware of them, educated about them and know exactly what this bee is and why it's a problem, and why we should manage. And furthermore, if we get African bees in our colonies, or our colonies become Africanized, what we need to do about it.

Amy 46:48

All right, well, thank you.

Jamie 46:50

Absolutely a pleasure.

Amy 46:54

We'd like to give an extra special thank you to the following: to our editors, Shelby Howell and Bailey Carroll, and for our audio engineer James Weaver, without their hard work Two Bees in a Pod would not be possible. So thanks, guys.

Jamie 47:07

For more information and additional resources from today's episode, don't forget to visit the UF IFAS Honey Bee Research and Extension Laboratory's website UFhoneybee.com. Do you have questions you want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on twitter, instagram, or facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to our podcast, Two Bees in a Pod.