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EPISODE 197 TRANSCRIPT

Jamie

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed 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 Podcast.

Amy

Hello, everybody, and welcome to another episode of Two Bees in a Podcast. Today, I am joined by Liz Walsh, who is a USDA-ARS Research Entomologist at the Honey Bee Breeding, Genetics, and Physiology Research lab at the Baton Rouge lab in Louisiana. Thank you so much for joining us, Liz.

Dr. Elizabeth Walsh

It's my pleasure. Thank you for having me.

Amy

I'm really excited to have you on today because we are bringing you on to talk about hangry bees, and I love that we're calling them hangry. Every beekeeper in the world knows that bees do get hangry just like we do. But before we get into that, can you tell our listeners about yourself and how you got into the beekeeping world?

Dr. Elizabeth Walsh

Absolutely. Not to age myself, but I kind of think of beekeepers as aging the way we all do. And so, I'm so proud to say that I can now vote as a beekeeper. I've been beekeeping for just over 18 years now. I started in high school, actually, where I was working at an apple orchard, and I had a coworker and friend who was very into beekeeping and got me excited about it. So, it just snowballed out of control from there and took over my life in the most fantastic way possible. I began working at a beekeeping supply store. I got involved in establishing colonies at my undergrad's prairie, and then I started trying to incorporate honey bees and honey bee biology into my biology work as an undergraduate, and that's where it really, really took over my life. So, I pursued a PhD in honey bee health, specifically queen reproductive health, and here I am today.

Jamie

Liz, I've had the fortune of being able to watch you give a talk on this hangry bee concept. It reminds me of years and years ago, about 10-15 years ago, there was a series of Snickers commercials where people would get really hangry, and then they'd be played by actor who's really angry, and all of a sudden they give them a Snickers and they calm down. And every time I hear that word hangry, I think about that commercial. And I've watched your talks. I really love this concept. There was a great spotlight of your Hangry Bee Project in a recent Bee Culture article. For our listeners, we've got international listeners from countries all around the world, so could you talk about what hangry even means? What's the history and background of this project?

Dr. Elizabeth Walsh

Absolutely. And I just want to start off by saying, Jamie, thank you so much for the compliments. I've always really enjoyed your talks. You're so charismatic, so it really means a lot to me that you've gotten a chance to see and approve of some of mine. So, hangry is smashing together of the words hunger and anger. It sort of colloquially refers to that emotional state of frustration and sometimes anger that humans get into when they get hungry where we might get cranky. And any parent with small kids or anyone that's been around small kids has particularly seen this, I suspect.

But as beekeepers and as scientists, we really think of aggression and defensiveness and these sort of core temperaments as a genetic state of honey bees. And there's a lot of really, really neat work which shows that this is the case, that the genetic background of bees absolutely does play into temperament. But I think that as someone that comes into science from a beekeeping background, sometimes we lose sight of things that the beekeepers just know. So, for instance, there are things that have nothing to do with genetics that we know play heavily into colony temperaments. So, things like a state of queenlessness or broodlessness sometimes, and particularly a state of nutritional deprivation.

So, when I first was newly hired in 2022, I was in that new PI, spinning your wheels, oh, my gosh, what is going to be my first big project? Ideally, it's going to be cheap and approachable and something I can do with a lot of colleagues. And a temperament study occurred to me as a really neat possibility because I've never kept bees in such a neat place as Baton Rouge, where there's this incredibly dramatic tallow flow that stops hard in the spring. So, the bees are super happy and very easy to work well, there's this major nectar flow going on. And when the nectar flow stops, you as a beekeeper notice. So, it took me a couple months to get things together, but I wanted to try that again and to try it with pollen because pollen's a little bit more easily manipulated than nectar flow going into a colony is. So, we hypothesized that. Before I get any further, this was this massive undertaking that was initially done by me and colleagues Mike Simone-Finstrom, Arian Avalos, Kay Eiley, and Pierre Lau.

So, we looked at if colonies in one yard when they had pollen traps put on became hangry, and we measured this with a very standardized aggression assay. The aggression assay is kind of like a ratings assay where I rate them in four different behaviors that have strict criteria, and they get this aggression score. We found that in this one yard of colonies, the bees that were pollen deprived did get noticeably hangry. They got more aggressive or defensive than their colleagues whose pollen was not getting stolen. And the undergrads just thought I was crazy because the first, I think around week four or five, was when the bees first became statistically significantly more hangry. And I was dancing around the bee yard because it was such an incredibly dramatic difference in stings. It was just so funny because the undergrads were trying very hard not to get stung. But I was very happy.

Amy

That's very funny. Yeah, definitely that everyone was getting stung because you're like, OK, there is a difference.

Dr. Elizabeth Walsh

Yeah, it is working, which is one of those weird scientist things where it's like, no normal beekeeper would be happy about this, but here we are.

Amy

That's funny. So, let's go back to discussing the research question and more in depth about the methodology that you had for this project. So, can you tell us about the research questions that you had? And then, I would love to hear about the methodology and the assay and what you looked at.

Dr. Elizabeth Walsh

Oh yeah, absolutely. So, first off, I want to sort of preemptively apologize to the very detailed oriented people who have strong feelings about word choice because I drive everyone equally mad by using defensive and aggressive interchangeably in the context of this experiment. I do that in part because the assay is called the aggression assay. But there are people that feel like you should never use that word with honey bees, you should always say defensive. So, I think there are pros and cons to both. But to go back to your question, the research question initially was, is this even a thing, right? Do bees have a change in temperament that is quantifiable if they're nutritionally deprived? We found out that they did. We did this, that first year, just through very simple aggression assays, and these are assays that are based on one that Ernesto Guzman-Novoa actually reviewed pretty extensively. He looked at different kinds of aggression assays. You've got those classic ones where you put pheromones on a piece of suede or leather and wave it in front of the colony, or you drop a brick on the colony, and you see how many bees would sting the suede. But the ratings assay was actually one that he felt was the most realistic

and recommended the use of. That was because it was both economically incredibly feasible, but also because it was the most repeatable.

And when I say that to people initially, sometimes there's a little bit of confusion. Why would an assay where the observer rates four different behaviors, flying, stinging, running, and hanging, why would that be more repeatable than the number of stings and a piece of suede? But I think part of that goes into environmental conditions. So, if there's a lot of wind one day and your assay has something to do with pheromones, the way those pheromones travel is going to be very different than if you are simply opening up a colony and rating behaviors. I also feel like it's just more realistic for beekeeping to rate behaviors that a beekeeper would notice. So, when you first open up that colony and the bees are calm, it's like, oh man, this is a good colony. When you open up the lid and a bunch of bees fly out and maybe are bouncing off your veil, immediately running around, it's like, oh, get the smoker, they're upset. We use this ratings assay in our work, and we found differences that first year, which led us into a second year which was bigger and better. So, the second year we were interested in seeing if aggression correlated with genetic stock. We had more than one stock of bees and also disease state. We were monitoring for viruses and Nosema.

Jamie

All right. So, you guys have a lot of project designs set up. What were your key findings? You've alluded to some earlier, but could you elaborate on this Hangry Bee issue?

Dr. Elizabeth Walsh

Yeah. We found that around week four or five, depending on the year in the genetic stock, bees that were deprived of pollen became more aggressive. That second year, we also found that there was an impact of genetic stock where some bees were genetically predisposed to being hangrier than others. We also found that nutritional deprivation had an impact on Nosema levels. So, weirdly, in contrast to some other studies, we found that our pollen deprived bees actually had higher levels of Nosema, which may have also had an impact on their behavior and temperament as well.

Amy

So, Liz, I'm wondering, you kind of mentioned it already. Why do you think the bees that were deprived of pollen became hangry? Do you think that it has anything to do with the Nosema? What are your thoughts on this?

Dr. Elizabeth Walsh

Yeah. So, that actually ties in to some really neat work that my colleague Kay Eiley is doing, looking at the recovery periods after a deprivation event like that. So, I'm going to speak anthropomorphically and treat the bees as humans in a way that scientists are not supposed to.

But I kind of think you need to answer your question that the bees are becoming more protective of the few resources that they have. So, scarcity sometimes causes behavioral changes. I think that might be playing into what we're seeing here, where the bees that have less food are more protective of what they have.

Amy

So, Liz, how can a beekeeper use this information in their own apiaries? What is your recommendation for a beekeeper to avoid their bees from getting hangry?

Dr. Elizabeth Walsh

That's a really good question. I think that beekeepers always need to keep the biology of the bees in mind and ideally alongside keeping the environment in line. So, here we've had extreme weather events in the last couple of years in Baton Rouge. There's been a need to feed that there isn't in other years. There's a higher likelihood of the bees displaying this sort of stressed-out hangry behavior because their environment is not making it easy for them to flourish.

Beekeepers can sort of use bee behavior as a barometer for how stressed out the bees are. Sometimes, bees can communicate as weirdly as it sounds. Bees communicate the best they can. So, beekeepers can both stop this from happening by preemptively feeding, but also, they can notice when there's extreme behavioral changes. The best way to notice is to keep good records. So, if you go out into your apiary and things are awesome, and then the next inspection period you go into the same apiary and one colony is really mean, or the entire apiary is really mean, those are both good things to notice and sort of dig into. Why is that happening? Did one colony become queenless? Did the entire apiary become malnourished? What's going on? And I think that beekeepers just can have increased awareness of that sort of behavior and that can help them.

Jamie

So, it sounds like to me when I hear you talk about this project, there's actually quite a lot of things that you guys are going to have to work out in the future, right? You get to the root of what causes this angry behavior. You guys have some hypotheses. So, it sounds like one of those projects that just breeds future projects, which is kind of the direction I want to head with this next question. Where are you going with all this? Okay, you've got this really neat series of results. It seems clear. How do you plan to continue in this arena? And maybe could you talk about some other things that you're doing at the USDA lab in Baton Rouge?

Dr. Elizabeth Walsh

Absolutely. Untangling what's an environmental impact versus a genetic impact is something that the unit and myself personally are really interested in and not just because it is in line with our mandate to breed a better bee, but it's also just scientifically so interesting.

We have such a complex study system and one of my favorite complexities that we've uncovered in the course of this study is looking at -- so, shout out to Holly Claire Richlaf at the University of Kentucky. She did some incredible work identifying genes that are associated with aggression. And so, we looked at those genes in young bees and we found that they were giving us profiles that caused us to want to know more. So, it seemed like bees that were reared in an environment that was pollen deprived didn't have elevated levels of these aggression associated genes. The bees that were reared in environments with a lot of pollen and then emerged into colonies that were pollen deprived did have really elevated levels of these aggression associated genes. So, what that showing is, or suggesting at least, is that there's some sort of colony environmental priming here that's happening where immature bees are almost getting some sort of expectation of what things will be like when they're adults, and when there's a mismatch there, it's stressful and it causes elevated aggression. That would be incredibly cool to take further. We'll see if we do and what the timeline of that will be, because the interest is there, but the resources are not at this time.

Amy

Well, I'm really excited, Liz, for you and for your career and the research and all the potential research that you'll be doing in the future. As we close, I just wanted to ask if there was anything **else that you wanted to add or share with our listeners?**

Dr. Elizabeth Walsh

Just thank you so much for having me and for the interest. I think it's so cool that I've gotten to benefit from so many wonderful older beekeepers, and it's because of those experiences that my science is informed the way it is now. So, mentoring younger beekeepers can be worth it.

Amy

Absolutely, and I would love to kind of put a call out to all of our listeners to tell us about their hangry bees and if they've experienced this and also, what their thoughts are on why their bees are hangry. So listeners, don't forget to send us an e-mail. We'll also be sure to link Liz's e-mail in the additional notes of our podcast. But thank you so much, Liz, for coming and talking to us about your research.

Dr. Elizabeth Walsh

Thank you so much for having me, this has been really fun.

Amy

Hangry bees. Jamie, what do you think about hangry bees?

Jamie

I've never thought about this concept before, but I was at that meeting one time when Liz mentioned it, and then I'd seen her talk about a few other times since. Of course, it makes sense, this idea that when bees are nutritionally deprived, their attitude can change. I'm really curious about why this might happen. Liz mentioned one of the possibilities would be they have few resources, so they have to defend those resources that they have, so their defensive behavior goes up. And if you recall, Amy, too, she mentioned that she had this idea in the first place, not because of a pollen deficiency, but because the nectar flow stops. So, it may not be just a pollen deficiency issue as well. This idea that lack of food resources causes bees to get grumpy. I think that's a pretty neat concept, right? The same for people, right? When we don't eat well, we can be quite hangry ourselves.

Amy

Yeah, definitely. I feel like there's a lot of research going on right now, especially with pollen and just the quality of pollen and what that actually looks like for bees. So, it's like it may not just be a nectar deficiency, it may be a pollen deficiency, but maybe even the quality of both. So, it'll be interesting to see, I think, in the future with all this research going on with pollen and its impacts on these colonies.

Jamie

Yeah, so you're 100% right. There really seems to be an explosion these days on honey bee nutrition work. And maybe, I don't know, maybe it was always there, but when I started working at UF 18 years ago, I just don't feel like I heard much about it. It would be this little study here or there, but now there's so many labs looking at pollen deficiencies and how that impacts so many different things and also trying to mitigate those deficiencies, right? There's all this pollen sub research. So, it really seems to be one of those topics that people are getting into.

I'm excited about that because I think pollen, nutritional deficiencies, and remedying those represent one of the greatest opportunities we have in the bee world to improve bee health. And it's just crazy to me that it's just this aside. Liz found that, oh, it doesn't just affect the things we know that it would affect, you know, brood or health, etc. It can even affect defensiveness. I just find that incredible.

Stump the Chump

It's everybody's favorite game show, Stump the Chump.

Amy

All right, everybody, welcome back to the question and answer segment. Jamie, the first question that we have, this is about nucs and when to install nucs. So, the questioner's saying that they've heard that when you purchase a nuc that you should usually transfer or set up that nuc into whatever 8, 10 framed hive set up that day, usually later in the afternoon. And they've also heard

that usually you should open up the nuc box hive, let them sit for a little bit, let them orient themselves. So, really the question is, to summarize, when should you transfer a nuc over to an 8 or 10 framed hive body?

Jamie

That's a great question. I love the spirit behind the question because it really shows how inconsistent information people get when they try to look up information about honey bees and beekeeping. So, I give a lot of talks on bees around the world. If it's a science talk, like when I'm presenting data, I'm like, guys, here's what we know, here's how we interpret it, etc. But when it's a beekeeping talk, I always say, guys, I'm going to give you my opinion with this beekeeping management strategy because the bees, frankly, don't care. So, when I hear this question, the questioner wants that scientific answer, but in reality, the answer is it doesn't matter. You just move them over when it's convenient for you.

There are some things to think about. So, for our listeners out there, a nuc, if you're not familiar with that term, that's just a small colony. A small hive as well. So, it's a small colony and a small hive. And usually nucs are referred to by the number of frames they have. So, a 5 frame nuc, 4 frame nuc, etc. So, let's just pretend this is a 5 frame nuc, the individual went and purchased this nuc, was told where they purchased the nuke, that they needed to get that nuke into a full-size hive as soon as possible. Beekeepers here in the US sometimes call it up boxing or up hiving. They're moving the frames from that nuke into a larger hive. And the questioner even specifically says, I think, 8 frame nuc, 8 frame box if I'm not mistaken. But nevertheless, the question is when to do it. Well, presumably when you purchase a nuc, you are purchasing a colony that is fully occupying the box in which you purchase it. Otherwise, if you're purchasing a 5 frame nuc and there's only two or three frames of bees, you didn't get what you paid for. So, the reason I make that point is presumably the colony has grown to reach max capacity in that nuc box. So, when you purchase it and bring it home, then it is ready to be taken into that next step more often than not.

So, if you purchase it in spring and you purchase it in summer, you can do it when it's convenient for you, but I would definitely do it within the next week. The reason I say that is because if you're thinking spring and summer, the colonies are still growing. There's potentially still resources coming in. If bees are congested and they have all these resources, they're going to want to swarm. So, you want to beat that swarming tendency. So, moving nucs into full size hives in spring is a great priority. You can do it when you bring it back later that day or the next day, but I would definitely do it in the first few days that you purchase it. Doing it in summer is a slightly lesser priority. You might have a week to two weeks before you have to move it up into that next box. But in fall, you could probably overwinter the thing as a nuc if you have a nuc super with food reserves, etc. So, in reality, you just need to do it when it's convenient for you. I would probably do it the same day because I'm going out to the apiary anyway, so I might as well just do it. But it's no harm, no foul if you do it in the next week or two. The bees don't care. You

can totally do it instantly, even when the bees are naive. In other words, you've got that nuc closed up on the back of your truck, you get to your apiary, you put out the full-size hive body, and before you even open the entrance of that nuc to let the bees fly around, you can just open the nuc and start moving stuff over. The bees themselves just don't care.

Amy

Sounds good. Jamie, I didn't tell you this when I first started, but I've already responded to his question, and I'm really glad that your answer was along the lines of what I told him.

Jamie

Well, I'm glad that my answer was along the lines of what you told him.

Amy

I was worried I'd have to e-mail him back and tell him something different, but I think we're all good. So, for the second question that we have, this is about small cell foundation and the person is asking about small cell foundation and whether this could be used to increase the population of a hive. So, I guess I'm assuming you've got small cell foundation, which means that you have more, potentially, bees. This person runs a single deep brood chamber year-round. They're wondering if they start transitioning to small cell foundation if that would affect the population. What are your thoughts on that?

Jamie

Yeah, another good question, and I've got a lot to say about this, but I'll abbreviate it. So, small cell foundation is only a thing at all because people originally believe that using it could reduce the Varroa populations in your colonies. And when I was a postdoc at the University of Georgia and a fresh assistant professor at the University of Florida, I would go to meetings and I would hear proponents of small cell foundation for Varroa control just come in and light up the show, and people got all excited and then they converted and blah, blah, blah.

Well, my wife, when she was working at the Florida Department of Agriculture and Consumer Services, actually did a study on small cell foundation and Varroa control and found that it did nothing at all with regard to Varroa. Since then, Keith Delaplane and Jennifer Berry at the University of Georgia, show the same thing, Tom Seeley at Cornell show the same thing. Multiple projects have come out to show that using small cell foundation does not reduce Varroa populations in your colonies. There are lots of theories for why it would and why it did and all these anecdotal reports, but there's no scientific data at the moment, or at least any that I'm aware of that supports those claims.

All right, so now that the kind of Varroa cat is out of the bag or out-of-the-box there, what next? The questioner is saying, well, what if I use small cell foundation to increase my colony

population? The questioner didn't say it, but I assume they think that that might happen because, I mean, think about the term small cell. In small cell foundation, the cells are smaller than typical foundation. Therefore, you get more cells per unit area with small cell than you do with regular foundation. So, in a typical 10-frame brood box with small cell you would have way more cells, potentially, than in a 10-frame box that has regular cells. So, if the queens have more cells in which to lay, can you increase your bee population? And the answer is—

Amy

Yes?

Jamie

It's unknown. The reason it's unknown is because all the small cell work to date has been very targeted at if I use it, do I have fewer Varroa? Those kinds of questions. No one said if I use it, am I making more bees. Now, I'm going to say that with the huge caveat that the research projects that were used to test the Varroa angle also look at bee population by default. So, in all of those studies, or at least in most of them, people are able to say, hey, colonies that had small cell foundations had fewer or more bees. But remember, it wasn't a fewer or more bees study. It was a Varroa study where they also happened to measure bees. And in those studies, some showed more bees, some showed fewer bees, which is exactly what I would expect to see if the answer is it doesn't matter. So, I'm going to throw out this big disclaimer that it's still possible that it could affect bee populations, but the study would have to be designed to answer that question and not the questions that it's been used to answer so far. So, I would say the jury's out. But based on the kind of data that I've been seeing, scraping through multiple projects that weren't really looking at that as the main point of the study, but ended up measuring it anyway, I would say it probably doesn't matter at all. It doesn't matter how many cells you give a queen, they still have a max egg laying capacity, right? In my experience, even in the best of days, that's about one brood box full of brood. I know listeners out there will say, well my queen filled two brood boxes. Well, you know, that's the exception rather than the rule. Most queens can do about one brood box full. I know that there's a lot of two brood box beekeepers out there in the northern part of the US and other parts of the world, but if you were to condense all the brood from two boxes into a set of frames, it would occupy about one brood box, more often than not.

So, my point is, even if you're giving them more cells, it probably doesn't matter too much. But to be fair, there needs to be research on this topic because no specific projects exist to answer that question.

Amy

So, the third question that we have is about nucs again, and they're wondering about frame feeders in the boxes. So, when they're transferring 5-frame nucs to an 8-frame brood box, transferring the 5-frame nucs into an 8-frame brood box, where do they put that frame feeder?

Some people say that you should put it in the center of the brood box, others say that you should put the frame feeder on the outside wall. What would this look like and what would you recommend as far as installing nucs for the first time in an 8 or 10 frame box and where the frame feeder should go?

Jamie

Okay, another good question. It's been a three good question Stump the Chump, I like this. And in fact, I just realized the mistake I made with the first question. The first question, I thought the questioner had mentioned the 8-frame box. It's actually this third question where the 8-frame brood box mentioned. So, I was wrong about that.

Amy

I wasn't going to correct you, but that's OK.

Jamie

The answer's still the same either way, but in this particular question, the person's just basically saying I want to put some nucs into full size hives, but I want to feed them with a frame feeder. And for those of you who don't know what a frame feeder is, they go by another name here in the US, division board feeder. Basically, they would be a feeder that goes into a box in place of a frame or two frames depending on the volume of that feeder. So, in the US we have one frame and two frame division board feeders. If it replaces 1 frame, it holds a gallon or 3.7 liters. If it replaces 2 frames, it holds 2 gallons, so, over 6 liters, over 7 liters of sugar water.

OK, so the questioner is saying I'm going to move this 5-frame nuc into this 8-frame box, I've got to put in a frame feeder, so that's going to be one of those 3 frames that was waiting for the five frames going into the box. Where do I put it? I put the frame feeders, the division board feeders up against the wall of the box every time. It's always in frame position one. In the case of this 8-frame box, it would be in frame position one or frame position eight. I don't like to put frame feeders in the middle, positions 2 through 7 in the case of this 8-frame box because that splits up the brood nest, right? You'll have frames on one side of the feeder and frames on the other side of the feeder. Bees like sugar water and they're going to go to it in your box, so you don't have to put it right beside them, in this particular case, to incentivize them to go to it. If you were going to put it in a position, you would just put it up against where the nuc frames go.

So, let's think about it again this way. Let's say you have an 8-frame box, frames one through 8. You've got 5 frames of a nuc to put in there. So, let's just push those nuc frames up against one wall of the box. That would be frames 4 through 8. So now you're trying to figure out whether to put the feeder in one position, in two position, or in three position. You could put it in three position for a week and then slide it over to two position, and move the frame in the two position to the three position the next. In other words, you're walking that frame feeder week by week

away from the nuc frames that you put in there. But I think that's just too much management, too much to think about. I just put frame feeders in position one or eight in an 8-frame box or one or ten in a 10-frame box, put the nuc in the other positions and don't think twice about it. If anything, I put frame feeder in position one and then the nuc frames positions 2 through 6 and then frame 7 and 8 would be the other two frames in the box. And I might rotate those into the brood nest area as they start using that sugar water and expanding. But I don't overthink it. I'm usually right up against the wall of the box.

Amy

Sounds good. So, that first question and the third question were from the same person and I had already responded. So, again, I'm glad I responded the same way you did.

Jamie

Score.

Amy

Yes. So, thank you to Ian and Jared who sent over questions for today's Q&A. If you all have Q&A questions for us, please feel free to send us an e-mail or send us a question on one of our social media pages.

Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator, Mitra Hamzavi. Thanks, Mitra.

Jamie

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