

# Episode 44 Mixdown PROOFED

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bees, beekeepers, bee, strains, queens, virus, disease, varroa, honey bee, uk, imported, local, honey bees, move, norman, beekeeping, europe, talking, working, idea

## SPEAKERS

Guest, Amy, Jamie, Honey Bee, Stump The Chump

### Jamie 00:10

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. In this episode of Two Bees in a Podcast, we'll be joined, all the way from the UK, by Norman Carreck from Carreck Consultancy. He's a bee scientist in the UK focusing very heavily on the benefits of local honey bee strains. This is obviously a topic that we hear about everywhere we go so it's great to have Norman joining us to speak about this and where he sees it impacting beekeeping in the future. For our Five Minute Management segment, we're going to be talking about the pros and cons of various types of foundations. And we'll end today's podcast by answering questions from you, our listeners. Hello, everyone, and welcome to another segment of Two Bees in a Podcast. I will tell you, it's funny that we're doing this interview at this time because just this morning, I was meeting with two of my graduate students in the laboratory here at the University of Florida and we were talking about the growing popularity around this idea of what we call local honey bees, this idea that the honey bee populations where you are that are established for some length of time might be better adapted in the management setting that you find yourself keeping bees. And I mentioned to my two students, at the time, that this is something that I feel has really been gaining steam a lot in Europe. When I'm in Europe speaking to my European colleagues, the scientists there are often talking about local bees, local honey bees and how beneficial they are. So we're very fortunate today to be joined in this segment by Norman Carreck. Norman is a UK bee scientist. He now owns and manages the business Carreck Consultancy Limited. Norman, I've known you for many years now. We've worked together on a number of things. So thank you so much for joining us on Two Bees in a Podcast.

### Guest 02:36

It's good to be here.

**Jamie** 02:37

And Norman, you've been working a lot recently with this concept of local bees. You're based in the UK, you've gone to a lot of the same meetings I've gone to, so this idea of local bees is really gaining steam, so we're going to ask you a lot of questions about that. But before we do, Norman, if you could just do a little bit to introduce yourself to our listeners? Could you tell us about yourself, where you're based, what it is you do, and also, most importantly, we want to find out how you got into bees and beekeeping in the first place before we kind of get into talking to you about viruses and local bees and how well local bees can address virus titers in the area. So Norman, tell us a little bit about yourself.

03:17

Okay, well, my name is Norman Carreck. I've been keeping bees since I was 15. My parents were very interested in natural history, and it just happened that a friend of my mother's had some bee hives and bees. And this friend was moving away and wanted to know what to do with the equipment, and my mother and I thought, "Oh, wouldn't it be interesting to take up beekeeping?" And so we went to some evening classes and got some bees and I've been keeping bees ever since. And then that led to a career in bees. I did a degree in agricultural science, originally, and then I went to work at a place called Rothamsted Experimental Station where I was originally working on nutrition of corn crops. And then that job came to an end and the beekeeper who looked after their bees for many years was retiring, and they wanted a scientist who was also a beekeeper to take over. And so I worked there for about 20 years working on various aspects of bees from pollination, ecology, bee behavior, bee diseases, a whole range of things. And then unfortunately, that came to an end when the government decided to cut off funding. So I went off, and I was then asked to help set up a bee lab at the University of Sussex, which I'm still involved with. But then I also became the science director of something called the International Bee Research Association, and the senior editor of their scientific research journal for about 10 years. And in the last couple of years, I've been a consultant doing various projects related to bees and projects on bees and pesticides. So I've kept myself busy doing something that I find interesting for a long time now.

**Jamie** 05:23

I think it's funny, Norman, that you mentioned that Rothamsted, or at least the government, had kind of slowed the funding down for the bee program. Was this before after 2006? 2006 was when the world started going crazy about bee laws and I'm wondering if the government did it right at that time or right before or right after?

**Guest** 05:40

Did they write you an apology letter after that? They did it precisely at that time. Yes, it was 2006 when the whole group headed by somebody called Brenda Ball, who was a world authority on bee viruses, they decided they didn't want to fund any work on Varroa and viruses and other such things, just at the time when those topics became of world importance.

**Jamie** 05:45

The timing was bad. The timing was bad.

**Guest** 06:10

The timing was very bad. Sadly, though, they didn't apologize.

**Jamie** 06:15

The government? Apologize? Amy, how dare they.

**Amy** 06:17

This is a call for an apology. Oh, my goodness. Okay. So Norman, when we reached out to you, you sent us an article that you had just written. And so we'll be sure to post the article in our additional resources and notes that we have once this episode of releases. But you were writing an article about understanding the epidemiology of viruses on honey bees. So first of all, can you tell us what epidemiology is? And second, can you kind of summarize what your article is about?

**Guest** 06:46

Okay. Well, epidemiology is really the study of diseases, sort of understanding how a pathogen actually harms an organism and how it can be transmitted between organisms, and how that might fluctuate over time. So it's a general study of diseases, and you need to understand how these things work. And so I was prompted to write this particular article by the fact that we're in the middle of this huge global pandemic caused by a virus, which clearly has brought viruses to everyone's attention, something maybe they haven't thought about too much before. But viruses are important in bees. And it just so happened that I was prompted to write this article because several quite important papers about viruses had come out at that time. And so two of these were really review articles written by people in an organization called COLOSS, which is prevention of honey bee colony losses, and it's an international organization that Jamie has been involved with, and I've been involved with, and has a group studying viruses. These people put together two reviews, one on really what's known about the incidents and spread of these things, and another about what's known about their modes of transmission. And the articles really showed the way that things we think of as viruses of honey bees are called that because we've studied them in honey bees, but they may have come from other insects. They may have come from wild bees, and all these things are quite interrelated through visiting flowers and parasitic bees that prey on others and bees that rob from one another. So, all these different insects and plants are interconnected. We can't sort of assume that something is a honey bee virus or bumble bee virus. They're just viruses and they move around. But a key factor that came out of this review really is that the most important viruses, things like deformed wing virus, acute paralysis virus, Kashmir bee virus, Israeli acute paralysis virus, these viruses that are particularly important, and particularly widely spread, aren't necessarily in their natural locations. They've been moved around by the trade in bees around the world, and we can tell that because some of these things are what's known as a virus complex. There are actually local strains of the same thing that somehow all occur in the same country. So in the UK, we've got Kashmir bee virus, which was first found in the Far East. We've got Israeli acute paralysis virus, first found in Israel, and we got acute bee paralysis virus that seems to be native in

Europe. The fact that we've got these things is due to people moving around the world. And then, the third paper that came out was from some people at our national bee unit in UK, and they were looking at the long-term data that's been collected from the inspection of beehives. They were particularly looking at something called chronic bee paralysis virus, which was very important more than 100 years ago and seems to have caused a really devastating disease known as the Isle of Wight disease, which apparently wiped out a lot of bees in Britain and Ireland at that time, and then really disappeared again. But this paper shows that over the last 10 years, the incidents of chronic bee paralysis virus has increased in quite a dramatic fashion. And the data showed that commercial beekeepers, that is with a reasonable number of colonies, seem to have higher incidents of this disease than the amateur beekeepers who probably only have a few colonies. And furthermore, because the national bee unit has data of where queens have been imported from abroad and where they've gone, they were able to show that beekeepers who'd imported queens had higher incidents of this virus. Looking at the maps of the virus, it seemed to show that you would get an outbreak that suddenly appeared in one place and tailed off over the next few years. And then there'll be another outbreak, seemingly at random, and then tailing off over the years, and this seemed to be associated with imports of queens. Now, it might be that these queens were directly bringing in disease, but we know chronic bee paralysis virus was here already. Or it could be the imported strains of bees are more susceptible to local strains of viruses. Just as there might be local strains of beer around the world, there will be local strains of viruses and local strains of other disease.

**Jamie 12:13**

So, Norman, let's talk about this. Before we do, though, I really want to highlight a comment that you had said earlier because this is something I think about a lot and actually talk about a lot. You live in the UK where honey bees are native, I'm based in the US where honey bees are not native and there's always this tension, be it good or bad, there's always this tension between native bee scientists and honey bee scientists with this idea that the honey bees that aren't native are spreading all these honey bee pathogens around to these native bees. When in reality, you're right, Norman, we don't know for sure how many of these things that we deal with is beekeepers, be it viruses or bacterial pathogens, fungal pathogens, etc. We don't know how many of these things are natural pathogens to honey bees versus things they may have acquired from native bees. The reason we call these things honey bee viruses and pathogens, etc, is because that's where they're studied, just like what you said. I'm not convinced. I guess what I'm saying here is I'm not even sure at the moment what is a true honey bee pathogen versus what's a native bee pathogen and which direction they spread. And I just wanted to highlight that statement because I agree with you completely. But I want to boil down now to something that you've been saying and, of course, is the theme. I set this idea of us interviewing you, the whole idea is about talking about local bees, this idea that you've got these local strains of bees that may be better able to handle some of these issues, and you're introducing it from a virus perspective. In the summary to the manuscript that Amy mentioned earlier and that we're going to link into our show notes, you said that local bees consistently and statistically significantly survive better than other strains. So a couple of things. Number one, what is a local bee? And number two, what did you find related to local bees and their ability to handle viruses? And then number three, what does that say about conserving native honey bees and local strains in Europe?

**Guest 14:10**

Okay, there are several things there. So one of the things that always struck me about beekeepers is that, and I've met beekeepers, in many places around the world, one of the things about them is that they love arguing about things. And one of the things they will argue about is the idea that one type of bee is better than another one. And so many, many beekeepers are convinced that if they import something from the other side of the world, it would be better than the bee they have already. But, until recently, those kinds of arguments were completely pointless because you were trying to compare apples with oranges and nobody had done a decent experiment comparing different strains of bee under the same conditions. And so a few years ago, another group of people from this COLOSS organization we've mentioned already who are interested in bee breeding and the idea that maybe one of the reasons why honey bees are not doing so well is that people are keeping unsuitable strains of bee, and so they hit on the idea of doing a big collaborative experiment. 16 different labs around Europe got together from Southern Europe to Northern Europe, a good geographical range of places, and they decided they would do this collaborative experiment and at each of those sites, they would compare the local bee, whatever it was, with two other strains of bee swapped from other sites in the experiment. And so I think they set up a total of 625 colonies in total and looked at these. So they imported queens from these various things, set them up in large acreages and managed them in the way they would manage their normal management. They didn't treat them for Varroa, the Varroa mite, but otherwise, they did everything, and they measured all kinds of parameters, like the number of bees, the weight of honey, did disease assessments and so on. And then they looked at them over a period of several years, and there were lots of interesting results. And indeed, a whole specialist Euro journal came out with the results. But really, the big thing that came out of it was that overall, at every site consistently, the local strain of bee survived better than the non-local strains of bee. And that was really consistent. So it wasn't a particular subspecies did better than another, or it wasn't that bees in southern Europe did better than northern Europe or anything like that. But consistently, overall, it was the local bee that did better than the non-local ones. It's quite difficult to explain how that is or what caused that. But one of the sites in Greece, a much more detailed disease study was done and it showed that the same basic diseases were present, really, at all the sites and all the strains of bee, but the incidents varied quite a bit. And it seemed to be that the non-local bees were less able to cope with the local strains of disease, whether that's fungal diseases, bacterial diseases, virus diseases, and so on, and it seemed consistently the case. And so that was in Europe where the honey bee is native. But interestingly, I think in 2019, there was a study published from some people in North America, in New York State, who did a smaller but similar idea experiment, and they were comparing results from queens reared relatively locally in Vermont from queens reared down in California. And they found exactly the same effect, that the local strains of bee performed better than the non-local ones and had lower incidents of pests and diseases. And so of course, as you've said, the honey bee is not native to North America, but nonetheless, honey bees have been there for hundreds of years and long enough for local strains to have evolved.

**Amy 18:49**



Yeah, for them, definitely, to adapt to their local area, I guess. Yep. And Jamie and I always, we've spoken about some of our previous podcast episodes, it's just, we're not quite sure what's considered local because our bees are migrating so much around the country, and we have such different environments from Florida to New York, it's going to be completely different. So, that's always kind of been a topic of discussion between us as well.

**Jamie 19:16**

Amy, you're totally spot on. Norman, it's a philosophical discussion my team and I have in the lab a lot. What is a local bee? Because there's so much movement of bees around the US and I know, for example, a lot of our queens are produced in Georgia, Texas, Southern California, Hawaii, and Florida, southern states, the take-home message, and they're moved around the rest of the country. Probably two-thirds or more of our bees are tied up in commercial operations that are migratory. So it's an interesting philosophical discussion to even define what a local bee is. How long does it have to be in an area? What about admixing? There are a lot of questions, and I think maybe you guys in Europe have better control over that than some of us in other places around the world. Norman, I think Africa really provides a good example of this because I know in Europe, having visited so many times, there's so much beekeeping, bee breeding, etc, that the wild populations in some cases may be more feral than they are wild. But in Africa, it's truly wild. Right? There are a lot of wild populations of honey bees. Life has created a tremendous amount of diversity in the bee population, the honey bee population across the continent of Africa. And so you have nature's answer to this question where there are incredibly localized, adapted bees for whatever environments they're in. And what you're proposing is basically similar to how nature addresses problems in real life, right? I really think that this concept is neat, and it's certainly growing, really, as you mentioned, in your amateur population, that's what we would call our hobbyists here, it's really growing in our hobbyist population, and I think everything you've said there is just spot on.

**Guest 20:08**

Absolutely. I think we're in a better way of studying the natural evolution of variation between bees. So in Europe, of course, we have large land areas. So the bee that used to be native in Britain and Ireland, the dark European honey bee, was naturally spread over sort of Northwestern Europe, from sort of France, right up to parts of Germany, and so on. But of course, in the Mediterranean, there are little islands, so, Cyprus, Sicily, Crete, these little islands, Malta, all have their own, really, or had their own, really quite distinctive strain of bee. Charles Darwin wrote a lot about island populations of things and examined these finches and giant tortoises and so on, and found that they all evolved separate populations. And you can see exactly the same thing in these bees, these island populations of bees in the Mediterranean. But equally, even in a place like Britain, you have a huge range of different climatic conditions. So the bees in the extreme southwest have a very different climate to bees in the northeast of Scotland, and they might look similar, but over centuries, they will be evolved quite differently to cope with the local conditions. But even in the United States, clearly, a huge proportion of your commercial beekeepers have bee queens that are reared from a relatively small gene pool in huge queen rearing operations. But there will be amateur beekeepers with a small number of colonies who don't move their bees around and don't necessarily buy in queens and there will be fewer colonies of bees living in trees

and so on, such as the ones that Tom Seeley has started and so on. Those have probably developed local characteristics, it just needs somebody to look at them and to try and understand what's different about them. And it may be that there are indeed local strains of bee in North America that are better suited to that particular environment. It doesn't, from a scientific, from a biological point of view, seem terribly logical that there would be a strain of bee that would be ideal in Florida, in California, or way up in the north of the USA, which have very different climatic conditions, very different crops available, and other plants for the bees to feed on. It would seem logical that there may be strains of bee that are better adapted to those particular areas. But, of course, the commercial beekeeping sector has to move its bees from one place to another to be economic. But from the bees' point of view, that may not necessarily be the best thing. Yeah, I mean, absolutely. In Africa, I mean, the difference between Europe and North America and Africa is that in Europe, there are lots of honey bees, most of which are kept in hives, and some of which live in trees and other places. In Africa, it's the reverse and most of the bees are wild, and only a small proportion are kept by people in hives. And that may be one of the reasons why African beekeepers generally are less worried about disease problems than European beekeepers are because you've got a much wider population out there from which to draw and there will be disease resistance in there. All the while, you selectively breed any organism and you may be, whilst improving some characteristic that you like, you may be harming its disease resistance.

**Amy 25:11**

So I want to get back to something you had mentioned earlier about beekeepers wanting the next best bee like they think a certain bee is better than another type of queen. Right? So this is a question we actually receive pretty often. People are wondering, what's the best queen I can bring in? Or what kind of queen can I even import into my area? You mentioned in your article that the number of queens that are being imported has increased and I completely agree with you on that. But you're also talking about how local bees consistently survive better. So I'm wondering if there's any research that shows that there are unintended negative consequences by bringing in non-local queens?

**Guest 25:53**

Yeah, so I mean, so the starting point for that comment is I've been involved in a sort of follow-on project to that COLOSS project that I mentioned, a bigger project that's looking at sort of bee breeding on a commercial scale in Europe. And we were asked, at the start of it, to look in all the data from different countries around Europe to look at their trade in queens and other honey bee reproductive material. And we find a huge, huge trade and huge variation. And I was struck by the fact that the number of queens imported into the UK has greatly increased over the last 10 years. And traditionally, these queens tended to come from Australia and New Zealand, Hawaii even, and then laterally, they'd come from Argentina. But in recent years, they've mostly been from other parts of Europe, actually. But nonetheless, the total has increased greatly. And I don't quite understand why that is, because there aren't particularly more beekeepers. It simply seems that more beekeepers are importing queens and replacing them. I'm not quite sure why. Perhaps, somebody is telling them that it's a good idea. But, personally, my own experience of importing queens, particularly from New Zealand, is that they're lovely bees, but they're not particularly suited to our climate, and don't actually do as well as a lot of people imagine. And I suspect, actually, that a lot of the queens that are imported are not successfully

introduced and really disappear without a trace. So I'm not sure all these queens coming in do a lot of good, but equally, they can do harm in that if you have somebody or a group in an area who are trying to conserve the remaining native honey bees in Britain, if people are importing Italian strain bees from various parts of the world or Buckfast bees from various parts of the world, it can harm their conservation efforts. And again, coming back to these little islands in the Mediterranean, it's much easier to study the effect. And scientists have looked at the bees in Malta and the bees in Cyprus and found that yes, indeed, the native bee there has been diluted and is in danger of being lost because of these other strains of bees that have been imported over the years. Other negative consequences could be something as simple as bad temper for example. So, if you cross two very different strains of any animal together, you get something called hybrid vigor. And in the case of bees, hybrid vigor can express itself as bad temper. So if a beekeeper has a very good-tempered strain of bee and somebody else next door imports some queen from elsewhere, which, on their own, may also be good-tempered, you put the two together and their offspring can be very bad-tempered. And if those people are living in an urban situation, and they have bad temper bees go around stinging everyone, then that has a very bad effect on the image of beekeeping. So, clearly importing local bees can have a number of negative consequences. And I've already mentioned the possibility of disease being brought in on imported queens and I think we have good evidence that can happen.

**Jamie 29:50**

You mentioned something that's really near and dear to me. My team and I are starting to do some work with the different subspecies of *Apis mellifera* scattered throughout Europe, the Middle East, and Africa. And one of the things that's really alarming to me is how some of these subspecies may be disappearing altogether, just like what you mentioned, the dilution rate there in Malta. You're specifically speaking about local bees, and I would argue, that's maybe a very localized strain of a particular subspecies you have native. Here in the US, we're not allowed to import honey bees. We can't bring in honey bees from other countries. There are some provisions for bringing in semen and things like that, but it has to be permitted, etc. We can, however, move bees freely between US states and territories. So Norman, I want to ask you, before I get to some scripted questions I have here, are you able to move bees between member states of the EU? Of course, I recognize that the UK is no longer a member state of the EU. But prior to that, were you able to move bees freely between, say, Italy and the UK and Germany and Switzerland, I guess?

**Guest 30:57**

In general, you are allowed to move bees freely within Europe. But in fact, the single market that exists in Europe is not quite as free as it might appear, and it is possible for countries to put up certain barriers. So there are a number of countries, and Slovenia, which claims to be the home of the Carniolan bee, is particularly proud of its bees and was able to set up laws that ban any import of bees from elsewhere. This means that you are only allowed to keep the Carniolan bee. And there are a number of other countries that, in theory, have restrictions that you're not allowed to import bees, but talking to people for this survey we had to do, we do know that some imports take place. But yes, in general, it's possible to move bees from Italy to the UK, for example. Although, of course, we officially left the EU on the first of January. As far as queen bees are concerned, I think the situation remains the



same. Because we're no longer a member of the EU, it actually means that we're not allowed to import packaged bees from Europe anymore, which is an interesting consequence of Brexit. But yes, in general, it's been possible to bring bees around the world subject to sort of health conditions and so on.

**Jamie 32:38**

Well, I think that's an interesting dilemma, right? I mean, if you're proposing throughout our discussion this idea of local bees, you've got the data to back up, some early data, this is not something that people are studying around the world, but the European case studies that you've given as an examples from COLOSS are showing that local bees may be more tolerant of local variants of viruses, etc. It could be a dilemma if we're moving bees so freely between if you're trying to conserve local bee populations. So let me just ask you a couple of quick questions. With all of that said, I'm going to ask you from a UK perspective exclusively, based on everything that you've seen, what do you tell your beekeepers in the UK? I mean, what are some take-home messages regarding this idea of local bees? Do you encourage your UK beekeepers to rear their own queens and breed locally? Do you believe this can all be applied globally? Are these all recommendations we should all be following as beekeepers regardless of where we are in the world?

**Guest 33:37**

Yeah, so, from the UK, as I said earlier, I'm not entirely sure why people are importing all these queens into the UK. But I think, really, the main reason for doing so is that it's not that easy to get hold of UK-reared queens. There aren't very many queen producers, a handful of people working on a commercial scale, and not that many beekeepers raise their own. And the reason for that, really, is that our weather is not particularly conducive to queen rearing. Now, our climate is wonderful. And in theory, we have a very long period when you could get queens mated, but the weather is often terrible. And so you can be a really good beekeeper, you could do everything right, you you can raise all your your queen cells and you can put them out into your mating nucs, and then, unfortunately, it can rain almost every day for a fortnight and all your efforts are wasted. And so it is quite difficult in the UK to reliably produce good mated queens, but it's not impossible. And so I think we can do a lot in encouraging beekeepers to rear more queens. There are a number of organizations that have existed a long time. But I think there's greater interest, now, in encouraging people to rear their own queens. In terms of what queens they should raise, my feeling, generally, is that probably the best bee for any particular individual beekeeper or group of beekeepers is probably the bee they have already. But that's not to mean you can't improve it. By simply culling out the worst ones, you can make a huge improvement in quality by getting rid of any that are obviously susceptible to disease or any that are bad-tempered. You can actually make a very swift improvement in the quality of your bees, even before you start selectively rearing and mating and so on. And I think the real problem in the UK is that we don't have this particularly good and efficient setup of a queen rearing industry, and we can do a lot more. In terms of other countries, I think the same principles apply throughout the world, but probably, rather than looking for something on the other side of the world, beekeepers should be looking locally to see what are the best bees they've got already available and working from those. Clearly, the setup you have in the United States with these huge queen rearing operations would make it very difficult to adapt to that sort of system, but probably not impossible if the demand is there.

**Amy 36:46**

So in your article, you make a really bold statement. You say, "it will become increasingly unacceptable, both ethically and politically, to import queens into the UK." So the last question that I have for you for this interview is that I was wondering if you could just elaborate on this.

**Guest 37:06**

Yeah, I mean, it's not me sort of saying what I think should happen, it's sort of like predicting what I think will happen. And I think the global COVID-19 crisis actually has really focused all these ideas in seeing the way that a disease can rapidly spread from a focus in China to spread throughout the world in a very short space of time, has really drawn people's attention to that. And now, over the last few months, the idea that we have locally adapted strains of this virus, so the UK is apparently proud of the fact that we've got a new and more easily transmissible variant, and we're now talking about new variants from South Africa and Germany and Brazil, and so on. So it shows how rapidly diseases can evolve, and how rapidly they can be moved around the world. In other fields of animal husbandry, we're well aware that exotic diseases can be moved around by moving a biological material around. We have problems with invasive plants that move around the world, new diseases affecting trees, and so on. And I think people are becoming a lot more aware of the fact that, generally, it's not a terribly good idea to move biological things, whether they be people or plants or animals around the world. You need to think carefully before you do that, and think, do we really need to do that? And so I think, from a political point of view, it will become less acceptable to move things around the world willy-nilly. There are so many examples you can raise. And then, on top of that, this idea of the fact that in the UK, we do actually have a native strain of bee, which is worth preserving, and which we now know is present. And there are places, certainly in Ireland, that have very pure native bees, and these are worth conserving for their own sake. I'm fairly happy to stand by that statement. And you can ask me again in 10 years time whether it comes to be true, but I suspect it will be.

**Jamie 39:46**

Well, Norman, I think it's bold, but I also think it's correct, right? Again, just for the listener, "it will become increasingly unacceptable, both ethically and politically to import queens into the UK." I think that's a very interesting take on something. You use the COVID pandemic that we have as a good example. I think the world's going to change, the science is always updating our views on these things. We've talked a lot with you about local bees. I find this utterly fascinating. You talked early on about their virus tolerance and maybe some other things. I can't really wait to see where this local bee research and science goes. I think, just like what you've talked about in the interview, it seems to be the thing people are thinking about at this moment, and I really am appreciative that you've taken some time out of your day to join us on Two Bees in a Podcast to talk about local bees, some benefits of using them, and where you think things are heading in the future with these bees.

**Guest 40:45**

Okay. Well, thanks very much. It's been great talking to you.

**Jamie 40:48**

Absolutely, Norman. And I look forward to being able to see you soon. Everybody, that was Norman Carreck from Carreck Consultancy Limited in the UK talking about local bees, the benefits of using them, and some long-term implications, and just where Norman sees things heading in the future with local bees. Thank you for joining us on this segment of Two Bees in a Podcast.

**Honey Bee 41:15**

Have questions or comments? Don't forget to like and follow us on Facebook, Instagram, and Twitter @UFHoneyBeeLab.

**Amy 41:30**

So we are at the Five Minute Management time. Okay, so I'm about to start the timer, and start. In the last episode, which we will link in our show notes, the Five Minute Management was what kind of foundation do we use? Now I'm asking, what are the pros and cons about each foundation type? You have four minutes and 45 seconds.

**Jamie 41:55**

That's tough because it took me all five minutes to tell you what those six versions were. So I want to do my best here. All right. There are six types of foundation. I'll go through them super quickly as I talk about the pros and cons. The first is pure beeswax foundation, which is that thin sheet of beeswax that has the hexagons printed on either side. So the bees will build their comb on it, they'll store honey in it. The benefit of this, number one, is that bees seem to prefer pure beeswax foundation, which I guess is one of those, "No, duh," moments, right? Number two, you are able to cut out sections of comb that have honey and sell it as chunked honey or cut comb honey. People can chew this stuff without worrying about it having plastic or wire in it. A drawback of it is you can't use it for extraction purposes. It's got no support. So if you put it in an extractor, the foundation is pulling everywhere. The second version, the crimp wire, that's got that wire through it, the benefit of it is it's got that added support. Number two, bees like it. Number three, you can use it in extraction. I really like this, it's probably my preferred foundation. It just takes, as a drawback, a lot of time to install because you sometimes have to include cross wires. And secondly, you're not able to cut out sections of comb and sell cut comb or chunked honey because, well, there's wires in it. The third, that thin plastic with beeswax on either side, it's really good because it provides support to comb and makes it possible to extract honey out of it. The downside of this particular type of foundation, as I mentioned in the previous episode, is when bees clear off the wax from that plastic, they'll never build wax there again. So it can age over time and you can actually lose comb surface area. The fourth type of foundation, that thick plastic with that thin layer of wax on either side, man, if I were a commercial beekeeper, this is probably what I would use all the time. It's just so simple to install. It's so rigid, it's so sturdy, you can extract. The downside of it, again, is you can't make cut comb or chunked honey because you can't cut it out. People don't want to chew on plastic foundation. Another potential drawback is if the wax ever comes off, it does take bees a little bit of coaxing to get those bees to pull out the comb. Now, the fifth option are the whole combs that are made completely out of plastic, the cell wall, everything's made out of plastic. The benefit to the beekeeper is all the work's done. The downside is bees don't take it quite as well unless it's given to

them as their only option. So they have an entire super made exclusively of these plastic combs, plastic cells. And then the sixth foundation type is just whole frames that already have that hard plastic foundation built into it or those whole plastic combs built into it. The good news is there's almost no maintenance to that. You buy the thing already assembled. The downside, again, is you could only extract honey out it, you can only use it in the brood nest, you can't cut sections out, and also, if it's those whole pulled plastic cells, bees may be a little slower to use it. So there are kind of benefits and drawbacks of each. But I like to experiment. One of the beauties of beekeeping is experimenting with all the options, seeing what works best for you and your operation.

**Amy** 45:12

Very nice. And it sounds like the right tool for the right job, right?

**Guest** 45:15

Yep, absolutely.

**Amy** 45:17

You finished just in time. Congratulations.

**Jamie** 45:21

You want to have a strong foundation, Amy. Otherwise, everything else on top will crumble.

**Amy** 45:25

That's a good one.

**Jamie** 45:25

I feel like there's some sort of --

**Amy** 45:27

Words of wisdom.

**Jamie** 45:29

That's what happens when I get older, I just get wiser. Or older. Not sure.

**Stump The Chump** 45:39

Everybody's favorite game show, Stump the Chump.

**Amy** 45:51

Welcome back. It is the question and answer time. We've got questions on things related to honey bees, Jamie. I'm like, what?

**Jamie** 46:00

Well, that narrows it down. I'll be ready for this.

**Amy 46:03**

Yeah, that's fair. Okay. So our first email that we received, this person had a thriving hive, I feel like this is a pretty common incident, just someone has a thriving hive, everything looks really good, and then suddenly, a couple of days later, they'll see dead bees on the bottom screen or outside on the ground of the hive. What caused this? I think the main question for this one is, where can someone have an autopsy done?

**Jamie 46:31**

All right. So there's a lot, really, in that question. And so normally, when I'm having a conversation with someone about this type of thing, maybe they've emailed me with that email, the first thing I would say is, "I don't have enough information." I would start asking them questions that would help me, I hope, narrow it down. So essentially, what beekeepers often do with scientists like myself is they come to us almost like veterinarians. My puppy is sick, can you help me? My bee colony is sick, can you help me? So just like a veterinarian, I have to say, "Well, when did you start noticing it? What led up to this? What were you doing? Were they eating this?" All that kind of stuff. And so usually, when I go kind of through this triage review with beekeepers, the first thing I ask them is what were their Varroa levels? Did they have them under control, what were they using to treat Varroa? If they are unable to provide answers that I find satisfactory for those two questions, I automatically assume that it's Varroa. Even if they try to blame anything else, if they don't have their Varroa numbers under control, then that's usually my gut feeling. Apart from that, we've talked a lot in this podcast about the Big Three stressors being queen quality, nutrition, and Varroa. So I would default to, did they starve? Where were food reserves? Then I might branch out into things such as, what was the status of your queen? Was she laying lots of eggs? Was there a dearth that came by? When they start saying things like, "It dwindled over time." Anything can cause that, virus infection, Nosema infection, you can really get into this. So there's this kind of series of questions that I like to go through in these particular circumstances. The second question they asked is there a place that you can send your bees, so essentially looking for diagnostic services. So in the US, we do have a federal lab, the USDA lab in Beltsville, Maryland has a disease and pest diagnostic service, you can send bees to it. We'll make sure to have that link in the show notes. There are equivalents in other countries around the world. So if you're one of our international listeners, probably some of your bee scientists that your universities are working for, your federal government could potentially be able to provide that service. In the US, we also have the Bee Informed Partnership where you can pay a service to have diagnostics run on your bees, and they typically look for things such as Varroa viruses, Nosema loads, and things like that. If you suspect a pesticide kill where there's a large population of adult bees that die really quickly, and the ones that are still alive are acting strange, then there are, in the US at least, a couple of pesticide labs that provide pesticide screening services. For example, the USDA lab in Gastonia, North Carolina, I believe, provides a honey bee pesticide screening service. Cornell University provides one as well, and I know overseas that there are equivalents to that. So it really all depends on what it is that you suspect is the problem that would dictate where you send the sample because each of these labs, they all do different things. If you suspect it's pesticide, you'd send it to the USDA Gastonia lab or Cornell. If you suspect it's Varroa, you might send it to the USDA Beltsville lab or something like that.



**Amy** 49:42

Cool. My mind is running and I'm trying to catch it, first of all, but I feel like we need to make a flowchart or some sort of fact sheet that we can share with people.

**Jamie** 49:54

I think that would be a good idea. One of the things I was thinking while you were talking about your mind running is beekeepers need to be good at their first line of recognizing issues. It's tricky because we've all had dogs or cats and we've kind of all learned they limp or they are losing weight. We seek things. And since we're familiar with dogs and cats, we get it. But when people get into beekeeping, they don't necessarily know what to look for and what could be the issues. That's why it's so important to be able to recognize the stressors. And I think a decision tree, Amy, actually can be a really useful tool. So you heard it here first. Amy is going to develop some sort of extension document that you guys can walk through, hopefully, to lead you to some of the problems. I will tell you, Amy, there is a really great tool online called the BeeMD. If you go to the BeeMD, if you Google search the BeeMD you can walk through a, for lack of a better term, symptom checker, where you click in boxes what you're seeing with your colony and the BeeMD will suggest to you what it is that you are seeing or give you some possible options. So one of the good answers to this question that I should have thought about the first time around, which is go to the BeeMD, you can put in what you're seeing and get out some potential causes of what's happening to your colony. I really think the BeeMD would be a good option in this case.

**Amy** 51:18

Awesome. And yes, we will absolutely link that to our show notes, which is on our website. Okay, so the second question that we have --

**Jamie** 51:25

That was just the first question?

**Amy** 51:27

I feel like the Q&A is going to get longer and longer because now people that have listened to us, they want to just expand on what we were talking about previously. We received an email and the beekeeper's husband was trying to be helpful and set off a raid fumigator. The active ingredient for that is permethrin, 12.6% or so. So this was in the shed where this individual stored all of their frames and supers. All of their supplies were in there, their feeders their nucs, you name it, it was in there. So can this equipment still be used if it's aired out for a while? Or is there anything you can do besides just burn it all?

**Jamie** 52:06

Well, this segment is called Stump the Chump. Maybe I'm sufficiently stumped. We should get T-shirts that say something like, "I stumped the chump." Anyway, the short answer is I don't know the answer to the question. As a scientist, my gut tells me, based on what I know about permethrin and its impact on

bees, that if you just let the equipment air out for a week or two that you're going to be absolutely okay. Frankly, time will heal this issue if there was going to be an issue in the first place. My gut tells me that it would not be an issue that it was fumigated, that you, again, let the equipment air out, perhaps, in an open-air shed, under a back porch or covered porch or something for a few days and you'll be okay. I can't promise that that's the case. I do know that permethrin can sometimes even be a repellent to honey bees, but I really think based on how it was delivered, if you give some time between using it and the administration of the compound, then you're almost certainly going to be okay. But I hesitate to say that with my University of Florida hat on. That's just my Jamie Ellis gut instinct. So air it out. Maybe try a piece of equipment or two to see how your colony responds. And then if it looks --

**Amy 53:22**

And if they abscond, then maybe

**Guest 53:26**

I will say, though, if this had happened to me as a beekeeper, my first reaction would not be to get rid of all the equipment. I would air it out and give it a try.

**Amy 53:35**

For sure. That's just, I mean, basically like burning money.

**Guest 53:37**

Yeah, but do a little bit at a time. You don't want to overdo it just to see what's going to happen.

**Amy 53:42**

Cool. Okay, so for the third question that we have, so we know that a colony will replace their queen if she is damaged, right? So has there been any research done on what constitutes damage? So if someone clips a queen's wing, is she more likely to be perceived as damaged?

**Jamie 53:59**

Okay, so if you do a bad job clipping a queen's wing, potentially she could be perceived as damaged. I happen to clip my queens' wings, and I've never believed myself to have a queen replaced because she had a clipped wing. She would live months or maybe even a year or two after me clipping so I don't think clipping is an issue.

**Amy 54:18**

But what does that mean, like a bad clipping versus a good clipping? All right. Well, great. Thank you, everyone. I hope you keep your questions coming. These have been really great questions, especially follow-ups from a lot of our 2020 episodes that came out. So keep them coming, send us emails. Again, if we haven't answered your questions yet, go ahead and send me another email and just poke at me. Make me do it.

**Jamie 54:21**

Queens have four wings, a big one on either side and a small one on either side of their body. When you clip a queen to keep her from being able to fly, you cut half of one of the big ones on one side of the body. Big ones are the front wings so they're called forewings. So you're clipping half of one forewing. And I've seen people do such a bad clipping job that maybe they cut both wings in half, all four wings in half on both sides of the body or even leave just a nub. But in a standard clipping, I don't think it's a problem at all. Usually, what I see precede a queen that is replaced is if she is in some way maimed. Perhaps, she's not able to move a leg or two or is missing a leg or two, or if she has a low egg output or is a drone producer. Some very visible problem. There are times where my queens are replaced when I cannot otherwise see a problem. Maybe the brood pattern is great, maybe she looks physically okay, but for some reason the bees just replaced her. I think less is known about those episodes. But oftentimes, what I say in those cases is it might be a case of, yes, she can look good and be doing well, but bees recognize their queens via pheromones. So perhaps, she has a lower pheromone output that plummeted and maybe you can see her and see her output, but you can't smell her and know that she's there. And so I think there's a lot of things that can lead to what we call supersedure, this replacing of the queens. But in a large percentage of the cases, I think it's because she's maimed in some way or she's underperforming in some way, laying fewer eggs, laying only unfertilized eggs, things like that. Usually, I see supersedure follow what is something very visible to me that I'm going, "Yeah, she's not looking good."

**Amy 56:43**

Hey, everyone, thanks for listening. Today, we'd like to give an extra special thank you to our podcast coordinator Lauren Goldstein and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

**Jamie 56:57**

For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website [ufhoneybee.com](http://ufhoneybee.com). Do you have questions you want answered on air? If so, email them to [honeybee@ifas.ufl.edu](mailto: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 Two Bees in a Podcast!