T R A N S C R I P T

LEGISLATIVE COUNCIL LEGAL AND SOCIAL ISSUES COMMITTEE

Inquiry into the Closure of I Cook Foods Pty Limited

Melbourne—Wednesday, 24 June 2020

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WITNESSES

Professor Ben Howden, Director, and

Dr Susan Ballard, BSc, PhD, Principal Scientist, Microbiological Diagnostic Unit Public Health Laboratory.

The CHAIR: I declare open the Standing Committee on Legal and Social Issues public hearing. Please ensure that your mobile phones are silent. There are not many people in the gallery now, but if they do come in: please be quiet. As we acknowledged earlier but just would like to acknowledge again: we are gathered on many lands of the Aboriginal people, and we pay our respects to their elders, both past and present. We particularly welcome any elders who are here today to impart their knowledge but also any Aboriginal people who are watching the broadcast of these proceedings. Welcome, all members of the public who are watching the proceedings via live broadcast.

The committee is hearing evidence today in relation to our Inquiry into the Closure of I Cook Foods. All evidence taken at this hearing is protected by parliamentary privilege as provided by our *Constitution Act* but also under the standing orders of the Legislative Council. Therefore any information you give today is protected by law. However, any comment repeated outside this hearing may not be protected. Any deliberately false evidence or misleading of the committee may be considered a contempt of Parliament. As you can see, the evidence being recorded. You will be provided with a proof version of the transcript. We encourage you to have a look at that. Ultimately it will be published on our website.

So welcome. Thank you again for making the time to meet with the committee, and if you would like to make some opening remarks, we will then open it up to the committee discussion.

Prof. HOWDEN: Sure. Yes, I will introduce myself: Professor Ben Howden. I am Director of the Microbiological Diagnostic Unit Public Health Laboratory. It is a mouthful, but we are the department of health funded public health laboratory for Victoria that focuses on foodborne diseases and bacterial pathogens, and with me I have got Dr Susan Ballard, who is my Principal Scientist overseeing the activities of the laboratory.

I thought I would just give a brief overview of our role as the public health laboratory, if that is okay, then happy to take questions obviously. As I said, MDU, which is our lab, is funded by the Victorian government through the Department of Health and Human Services, and we provide specialist microbiology reference services really focused on the investigation, surveillance and control of communicable diseases and food and waterborne outbreaks. I am the Director, as I said, and my expertise is in medical and public health microbiology. Susan is the Principal Scientist, and her expertise is in bacterial typing methods, molecular biology and whole genome sequencing of bacterial pathogens.

MDU acts as the Australian listeria reference laboratory—this is since 2014. We receive isolates—they are bacterial isolates—or the genome sequence of isolates that have been performed in other jurisdictions for typing and strain comparisons using microbial genomics, and this is for all states and territories around Australia. Results of these analyses are provided to OzFoodNet at the Australian government Department of Health in Canberra, with copies to OzFoodNet epidemiologists based in each jurisdictional health department, inclusive of the Victorian Department of Health and Human Services communicable diseases branch.

Importantly, we hold accreditation under international standard 15189 for human pathology testing, which is medical testing, and ISO 17025 for environmental food and beverage health care, pharmaceutical and media products testing—this is called biological accreditation—and also animal or veterinary testing, and we hold accreditation for forensic operations across all of these fields. We operate under a quality management system, fulfilling agreements and meeting the requirements of ISO 15189 and Australian standards ISO 17025 and associated regulatory documents, which impacts on our accreditation, and we have accreditation under NATA, NPAAC, DHHS in relation to SSBAs, the OGTR, and the TGA. So that sort of covers off our accreditation and the sort of frameworks that we work under. The work that we do in relation to listeria, the detection of listeria in food samples, is performed according to AS 5013, the Australian standard, and accredited to the international standard 17025, and we also have accreditation for our genomic—I mentioned the bacterial genomics work that we do—to IS 15189 and IS 17025.

So that is the overview of the type of laboratory we work in and the type of work we do. I am happy to give some specific details about the case isolates, if you would like that, or I am happy to take questions, whatever you prefer.

The CHAIR: Unless you would like to give a little bit of detail about the reporting in regard to the I Cook Foods reports that you undertook.

Prof. HOWDEN: Yes. So I will just give some general statements about that, which is that we receive samples from both human testing and environmental and food testing in our laboratory. The human samples come through from usually diagnostic microbiology laboratories around the state, whereas the food samples come directly from department investigations into potential food-borne outbreaks. In this case we received a human-derived sample of listeria, and we received some food samples on behalf of the Department of Health and Human Services, and these were both tested in our laboratory.

What we do is we go through a process of confirming that the sample is listeria or the food has listeria in it, and then we undertake testing to look at the subtypes. So we perform a number of what we call typing methods, so that is to look. Once we know it is listeria, we then drill down further and further to understand the exact subtype and go to the point of sequencing the whole genome of the bacteria. So this is an important technology in public health microbiology, where it is the highest discrimination of understanding how bacterial strains relate to each other. And so that is the way we would now generate our reports, and the reports that have been submitted to the epidemiologists are based on a number of typing methods, but most importantly on whole genome sequencing of the human and the food samples.

The CHAIR: Thank you, Professor. Committee, we have got about 4 minutes each for questions. We will probably go in the same order, except, other professor, you can start.

Dr KIEU: Thank you. I have a few questions. First, could you present from your end the time line of the issue related to I Cook—when you received the sample? And were you involved in testing for listeria connected to the death of the lady and subsequent samples? Secondly, the second part of the genome sequencing is very important—for example, with COVID now we can do that and find out the strain and see the connection. So in this case of the listeria in the I Cook case is there any definite—I should not use positive—identification of the connection between the one that you may or may not have found related to the lady's death and the food sample you received? And the last thing is: we have been hearing about how safe or how unsafe any level of listeria is for normal people, for pregnant people and for vulnerable people, so what is your point of view about the level of safety for those kinds of cohorts?

Prof. HOWDEN: I might ask Dr Ballard to present the time line, as she has prepared that, and then I will come back and talk about the genomic comparisons and the levels of listeria.

Dr BALLARD: I think the first important point to make is that we do not physically isolate the human isolate of listeria. That is done generally in a hospital diagnostic laboratory or it could even be in a private pathology. That isolate is then referred to us under the notification systems with the government and then we receive that isolate into the laboratory. In this particular case we received that isolate on 29 January 2019. Our first point there is to culture that isolate. It comes on a little bacterial plate, we grow it up a little bit further, and we actually store that isolate down in the freezer. We did that on 1 February 2019. Before freezing it down, we take a sample and we send it through for sequencing.

The food samples arrived in our laboratory—the four primary food samples that were received under chain of custody from the City of Greater Dandenong—on 1 February 2019. This was a Friday. They went straight into the fridge. We need a clear several number of days to process them, and our laboratory does not operate on the weekend. The samples were pulled out of the fridge on 4 February, and then they were processed for detection of listeria. Now, the food samples are taken in controlled amounts and they are emulsified. They are plated out onto media. We look for the growth of the relevant organism. We put it into enrichment broth to enhance the ability to detect that growth. Then once we have purified out those isolates we attempt to type them.

I believe we reported to the department of health on the 29/1 that we had received a human isolate of *Listeria monocytogenes*, and then we reported to the department of health on 11 February that we had a human—sorry, let me get my dates right. On 11 February we reported the binary type serotype, an MLST of the human isolate, so this is a subtype of the isolate—it is breaking it down like a telephone number. Then on 15 February we

reported that listeria was detected in the four food samples that we had received. On 21 February we reported the food isolate's binary type and serotype values, and then on 25 February we reported the MLST—multilocus serotype.

We then prepared on 26 February an interim OzFoodNet genomics report, which reports the relationship between the human isolate to the four food isolates. And then on 1 March we reported a full genomics report to OzFoodNet. Our genomics reports to OzFoodNet are fortnightly, and in the interim week we report any notifications of any obvious connections that have relevance to them.

Prof. HOWDEN: I will move on to the second question about the genetic relationships. I have a copy of the listeria report for 26 February 2019 in front of me. What this report highlights is that there were four non-human food samples that related to this matter and a human case that clustered together on the phylogenetic tree. We reported this as the four non-human food samples being highly related to each other and that the human case was possibly related to the non-human food samples.

This designation is based on previous work looking at the genetic difference between these samples. Listeria has about 2.8 million bases in its genome, and we found that there were less than 10 differences between the human sample and the food samples—but it was more than five. Because of the stringency of the criteria we use—for calling things 'probably' or 'highly' related, it is less than five; and then between five and 10, 'possibly' or 'probably', dependent upon epidemiological data; and then for greater than 20 we would say these appear to be unrelated—we classified this based on the genomic sequencing as possibly related. In that case our lab provides the genetic data, and then the epidemiology is what is then important. We are not privy to that epidemiology—you know, 'Did the person who had this sample eat the potentially related food?', 'What was the time line?' and those sorts of things—so we are not involved in that information.

Just to clarify further about the relationship, we have been recently requested to look at these samples in the global context. We do contribute to an international database called GenomeTrakr, which is run by the US Food and Drug Administration. Just a brief summary on that analysis: that database incorporates over 34 000 listeria samples, and an analysis of that, of the human sample that we are talking about in this case, showed that there were no other matches around the world in those 34 000 samples. The information that we have does confirm that this sample is possibly related to the food samples that we were talking about in the case. And then the level of listeria—I would just say that there are Australian standards around the acceptable levels of listeria in food, and we are not the ones who interpret and enforce those standards. We just report against the levels that we detect.

The CHAIR: Professor, we were presented with a report from the Doherty Institute that indicated that very similar samples have been found in Western Australia and Queensland.

Dr BALLARD: I think that there is possibly or potentially a misunderstanding there. There were no non-human MLST3 isolates presented in that report, I believe, that came from 2019. So if we are looking at the 26 February report—is that the report that you are referring to?

The CHAIR: Yes, it is.

Dr BALLARD: You will see a Queensland isolate listed. What appears to be close on the tree was a human isolate, for a start; it is not a food isolate. Interpreting phylogenetic trees can be misleading when you look at them from a visual point of view. The exact relationship has nothing to do with the vertical presentation of the data but with respect to the horizontal presentation of the data. If you were to look at it from a simplistic point of view and add up all of the different lines that connect those samples on the horizontal view, the distance between that Queensland isolate and the remaining Victorian isolates is quite long.

Prof. HOWDEN: It is summarised in the front part of the report where it talks about ST3. Sequence type 3 is a higher level classification of listeria. There are lots of sequence type 3 listeria samples around the world, but what the front page of the report suggests is that the four non-Victorian samples are highly related to each other and potentially related to the one Victorian case we are talking about. But there are no other cases that are potentially related. And then if you look at the colour coding on the tree, the sample that sits near these on the tree is actually in green and the code is that these recent cases are not linked to any other case and so no further investigation is required. So it is absolutely clear-cut that this Victorian human case is potentially linked to the

four food samples but not to any other cases in our databases, in the Australian databases or in the global databases.

The CHAIR: Right. So that would indicate you would be fairly confident that—

Prof. HOWDEN: We are confident these samples are closely related to each other. Our report suggests that the epidemiology will tell one way or another whether this is very likely to be the source of the disease or not.

The CHAIR: The level of listeria that was found, would that have typically made someone unwell?

Prof. HOWDEN: We detected—

Dr BALLARD: We did not report levels for some of the food samples, because they were only detectable on enrichment broth, so you cannot report the number of organisms present in the food sample; you have already amplified the growth of that organism. For the two food samples where we could report levels it was less than 10 cfu per gram, which is less than 10 colony-forming units per gram of material. I am not a medical practitioner, so I could not comment on whether that is sufficient to cause disease.

The CHAIR: I am sure I have not got the right terminology, but it would be considered an acceptable level or—

Prof. HOWDEN: We are not experts on the Australian standards, so we do not interpret the levels and then report on them in terms of acceptability. That is up to food safety professionals to do that, but our understanding is that that is below what is considered an acceptable level in ready-to-eat foods. But it is not our job to interpret that.

Ms CROZIER: Thank you for appearing before the committee this afternoon. Professor Howden, in giving an overview of what MDU do and the work that you do and talking about the samples received in terms of listeria outbreaks, can you define what an outbreak is?

Prof. HOWDEN: Any case of listeria technically does imply a potential outbreak because usually it is a foodborne source of disease, and so a human case of listeria would presumably, from the department of health's point of view, be considered an outbreak. I would say that that definition is an epidemiological definition that comes from the OzFoodNet epidemiologists at the department of health. In our minds within a laboratory we would consider any human case potentially to be part of an outbreak because there is presumably a food source of that disease, and so therefore there is a need to investigate the potential source of that.

Ms CROZIER: You kept reiterating 'possibly related', so it is not definitive in terms of the work that you have undertaken to identify the listeria in the samples that were provided. So there is that not wiggle room but just a cautious note in terms of what you do provide to the department of health. Is that—

Prof. HOWDEN: Well, I think that is appropriate, because we do not have the full story; we just have the laboratory side of the story. The interpretation of that data requires the whole picture. Did the person eat the potential food? We do not know that. We are just the lab doing the testing. Does it epidemiologically fit with the time line of when the food might have been consumed and the person got sick? Those are all things that the department of health and the epidemiologists there would know. What we are reporting is a very strict analysis just of the genetic data of the bacteria and how they relate to each other. We and other labs around the world have done a lot of work to look at the number of differences in the genome that would suggest that this is incredibly likely to be related—we can never say that this happened from this food to this person, because we were not part of that sequence of events and we are not investigating that—or it is very closely related but it does not fit into the first category or it appears to be unrelated; that is how we have classified it.

I feel like it is not my place to give an opinion on this at the moment, unless you particularly want me to do that, but it fits the classification of the middle. At the middle of that there were about nine differences out of 2.8 million. So there are 2.8 million bits in the genome, and nine of them were different between the human and some of the food samples. Even within the four food samples that were taken from the setting, there were seven differences between some of those food samples, so that shows you that even the diversity or the differences within the food samples are more than that cut-off of five. So although we call it 'possibly related', what we are doing is we are saying that it is not completely identical, we are worried about this and therefore we are giving

it that category of orange. It is not green, which is 'don't worry'; it is not red, which is 'definitely related'. But you then need to go back and investigate the epidemiology to make a determination.

Ms CROZIER: So the department would have done that epidemiological study to determine that.

Prof. HOWDEN: Yes, correct. The department would take our genetic data in the context of the rest of what they know about the case—the food and if it is an outbreak—and then they would be able to make a determination based on that. To give you the opposite end of the spectrum, if we had a food sample that was a completely different listeria type to what was in a patient, then we would confidently say that these are very different and this food sample you have provided here does not represent them.

Ms CROZIER: It was only one strain of listeria, was it, only one strain in this sample?

Prof. HOWDEN: In the food sample?

Dr BALLARD: In four of the food samples there was one strain, and it was the same. There were other food samples submitted where there were two different strains.

Ms CROZIER: Where did they come from? Where were they submitted from, the other samples?

Dr BALLARD: There were another two samples submitted from the City of Greater Dandenong that had a different listeria strain in them—an ST321—and then there was another food sample submitted by the City of Whitehorse that had an ST204 in it.

Ms CROZIER: Were any from the hospital?

Dr BALLARD: No, we only received one isolate from the hospital.

Prof. HOWDEN: The human isolate.

Dr BALLARD: Only one human isolate from the hospital.

Ms CROZIER: Not food from the hospital.

Dr BALLARD: No.

Ms VAGHELA: Was listeria detected at concentrations above the safe limit in any samples taken from I Cook Foods?

Dr BALLARD: I cannot comment on what the safe limits are.

Ms VAGHELA: How often do you see the presence of listeria in food samples in your lab? Is it very common you would see these results?

Dr BALLARD: It is not uncommon because it is part of a food safety outbreak. For example, we know the rockmelon outbreak was associated with listeria in the previous year, a year earlier. It was not uncommon to receive rockmelons and isolate listeria from that.

Prof. HOWDEN: I would qualify that response by saying that we are sent things to find the source of disease when there is an outbreak. We are not a food safety lab where we routinely get samples of food to check ad hoc. Do you know what I mean? We are investigating potential sources of disease in humans, so the samples we get are biased in that sense.

Ms VAGHELA: Is it the standard practice in the lab that once you get the samples you would just determine the presence of listeria first? And then, depending on if the finding was that, yes, listeria was present, you go upon the request to find the levels of listeria? Or that is the process?

Dr BALLARD: No, it is standard process to receive the food sample, to process it and if we grow it from the primary sample, to enumerate and report. It is standard process to report the identification of the organism that we have cultured from the food sample and then to go on and report the subtype of that isolate and then to go on and sequence it and report the genomic variety as well.

Ms VAGHELA: If the listeria level found is below the safe level, a healthy person might not have that much of an impact on his or her health. What would happen—with the level that was found in this instance, in the lady that died—if a similar patient was exposed to that level of listeria? Do you think the outcome would be dissimilar?

Prof. HOWDEN: I do not know if we can comment on that. We have reported the levels as we detected them. I do not think we can comment on that.

Ms MAXWELL: I am just trying to gain more of a chronological understanding. The first samples arrived on the 1st. The documentation I have here states that after the listeria infection of an 86-year old woman the laboratory released its first report on 11 February. How long does it take to grow those cultures?

Dr BALLARD: It takes around three days to grow the organism, or two days to grow the organism to a sufficient level to be able to harvest it for sequencing. It takes two days to prepare the samples for the sequencing instrument and over two days for the sample to go through the sequencing instrument itself, and then it has to go into bioinformatic analysis to get an interpreted result from that genome sequence. The exact time lines of processing a sample are largely dependent on the batch processing for sequencing, because it is a very expensive process so it is not done on demand on a single sample; it is batched with other organisms—not necessarily listeria, by the way. That limits or proposes the time line. In the case of the human isolate, we get the MLST from the genome sequence and we get the binary type and the PCR serotype from more rapid manual methods, other molecular methods that occur in the laboratory.

Prof. HOWDEN: It is worth noting that the primary listeria isolation and identification would have occurred at the clinical laboratory, so that result and the feedback to the clinician and the impact on the patient would have been at the primary laboratory. The sample is sent to us for this additional molecular characterisation which we do as part of our public health work, not as a diagnostic test.

Ms MAXWELL: From the time you received the sample, how long would it take you to then complete the report on the findings from those samples?

Dr BALLARD: We completed the first preliminary report on 11 February, and the first genomic report was not until the interim genomic report on 26 February.

Ms LOVELL: We received a report this morning that the Department of Health and Human Services supplied us that was the results of food samples and blood culture tests. There are several on 1 February that do not have the detected levels in them. I am just wondering if there—

Dr BALLARD: That gets back to how you grow the isolate up. As I mentioned, if we cannot detect the isolate on the primary plating step, we have to put it into what is called a broth and we grow it up. If you grow it up in a broth, you cannot count it. You can only count it if you plate it onto a solid media.

Ms LOVELL: We were told last week that there was listeria that was traced on several different ingredients. Do you test each ingredient to see if it is the same?

Prof. HOWDEN: No, the way the lab works is we receive all types of different food, but I believe in this case it was ready-to-eat sandwiches with a number of different ingredients and there were four different ones in the packet. Each sandwich was processed independently but not each ingredient.

Ms LOVELL: Right, okay.

Dr BALLARD: The standards require us to process them in 25-gram lots. So in the case of the mixed sandwiches, there were four 25-gram lots processed through. In the case of some of the other food samples—there were cucumbers, there was sliced silverside and there were other sandwiches—they were done in several 25-gram lots.

Ms LOVELL: Okay, so you cannot tell whether it was cross-contamination or whether it was—

Dr BALLARD: What do you mean by cross-contamination?

Ms LOVELL: Well, is it possible that one sandwich was contaminated when it was first put into the packet and the others have become contaminated from it?

Dr BALLARD: No.

Ms LOVELL: Or that there were contaminated ingredients in every sandwich?

Dr BALLARD: I could not comment on within the sandwiches and from where they were made, but with respect to our laboratory bench, we do not handle the pure isolates on the same bench that we handle the food products that we are attempting to—

Ms LOVELL: Oh, sorry, no. I did not mean on your bench, I meant within the packaging.

Dr BALLARD: Within the packaging, I could not comment.

Prof. HOWDEN: I think it is very hard for us to comment on that.

Ms SHING: Thank you very much for that. Dr Ballard, I am interested in understanding a little bit more about the distance between the Victorian and the Queensland isolates and the extent to which that means that they are less likely to be related. Can you just flesh that out a little bit more for my understanding, please?

Prof. HOWDEN: I can answer that if you want.

Ms SHING: Sorry, yes, Professor. Whoever.

Prof. HOWDEN: I spoke to it already. My apologies for not being clearer. For things that we consider not related, there are greater than 20 differences on the genome over that 2.8 million bases. I have not got the exact number for that particular isolate compared to the ones we are talking about, but the length of that branch on that tree suggests it is very different.

Ms SHING: All right. We have had a few descriptors of variables in your evidence of this morning. We have gone from 'probably' being around five I think, possibly around 10, 'not related' 20-plus if I am not misinterpreting what you have said. And the human case is possibly related to the non-human case, but then we heard it is very likely or potentially likely. And then you have also indicated that it is incredibly likely to be related based on the information that you have. Can we get a bit more specificity around that, just because we tend to work in questions of degree and because we are using non-scientific language we will have a very different layperson's understanding of what those questions of degree mean as opposed to the usage that you have for them.

Dr BALLARD: There are three categories of relationships: unrelated, possibly related, highly related.

Prof. HOWDEN: Highly related is between zero and five differences across the 2.8 million, possibly related is six to 20 differences—my apologies, I think I did say 10 earlier, and I apologise for that.

Ms SHING: Right, yes.

Prof. HOWDEN: And not related is greater than 20 of those differences, and I think I mentioned that the human sample has nine differences to the food samples.

Ms SHING: Right. So within the lower range of possibly?

Prof. HOWDEN: Yes.

Ms SHING: Yes. And so what is the best way to find out if two listeria samples are linked to each other, based on the fact that you test both food and human samples? The department, just for a bit of context, maintains that the listeria that you received from I Cook Foods was very closely related to the listeria in the patient. What is your take on that?

Prof. HOWDEN: So there are two ways to look at this. One is to just look at these differences at the genetic level, and we would call that 'possibly related'. So that is purely that measure, you know, the strict measure of zero to five, six to 20, greater than 20. It fits into that six to 20 category—

Ms SHING: As nine?

Prof. HOWDEN: Yes, as nine, correct. Then what you can do is take in the context of everything else we have in the database, which is a separate interpretation. And that is I guess what I alluded to earlier—where this is now being compared to every listeria sample we have in our Australian database and to 34 000 samples from around the world, and still this human case is not related to any other samples in that dataset. So the only samples that it is possibly related to are the food samples that are in question. Does that make sense?

Ms SHING: Yes, that confirms your earlier evidence. I think you said that it is clear cut that this Victorian case is linked to food samples and not to other cases. Is that circling back to what you said before, in the context of what you have just explained?

Prof. HOWDEN: Correct, yes.

Ms SHING: Yes, okay. All right. Thank you very much for that.

Mr LIMBRICK: I would just like to clarify something on the measurement of the levels. You said that for certain samples that have very low levels you have to amplify them using the broth.

Dr BALLARD: That is correct.

Mr LIMBRICK: And for those cases where that is required, does that mean that it is not actually possible to determine the level? When you send it back to whoever requested the sample, it would not be possible for them to determine the level. All you could say is—

Dr BALLARD: That is right. If we have to amplify the organism to isolate the organism, we cannot report a measured level in that sample.

Mr LIMBRICK: And so was that amplification required for all four of those food samples?

Dr BALLARD: All food samples received into laboratory go through both amplification processes and plating onto solid media for counting.

Mr LIMBRICK: And those samples that are related to this case—

Dr BALLARD: Two of them were recovered from amplifying and two of them were not.

Mr LIMBRICK: Right, so the levels were so low that you could not get them on the plating, but—

Dr BALLARD: The two food samples, but not for the other two.

Mr LIMBRICK: Right, and that would mean that for those two food samples it is impossible to determine the level because it is so low that, although you can detect it through amplification, you cannot through plating.

Dr BALLARD: That is correct, and that is why we do not report on levels for those.

Mr LIMBRICK: Yes, okay. All right, so that means that if there was a food safety level—that would be reported by someone else, not by your laboratory—it would only be possible to report that for two of the food samples and the other two would be indeterminate. Is that correct?

Dr BALLARD: That is correct.

Prof. HOWDEN: It would just be detected, but at no level.

Dr BALLARD: The report is 'Listeria detected'—full stop.

Mr LIMBRICK: 'Listeria detected', and then you would have some genomic data as well possibly—

Dr BALLARD: And then at various points there are other subtyping data that come through.

Mr LIMBRICK: And if it is only detected through amplification, what does that indicate with regard to the level that is actually in the food? Does that mean that it is a very, very small amount? I know you do not want to comment on the food standards and this sort of thing, but what does that actually mean?

Prof. HOWDEN: Microbiologically it implies, yes, it is at lower levels than what you can detect through direct plating. So you are correct in the assumption that if you have to put it through that amplification process, it is at a lower level—yes. So it is present, but because the amount of it is lower, it is harder to detect and you have to do that amplification process.

Mr LIMBRICK: Okay. Thank you.

Dr KIEU: I have time for one more question, just to try to understand. You have searched the Australian database and the international database kept in the US. So you have in your notes the differences with all of those with the one that has been discussed. Is it correct that they are all beyond the 20 differences, or do you have a better number than that?

Prof. HOWDEN: I do not have a better number. I do not have that number for all of the comparisons, but it is correct that there were no potential matches found. They were all greater than 20. Most of them are likely to be higher than that, but I do not have that number.

The CHAIR: Thank you. I think I am probably just picking up a little bit from Dr Kieu. In the report that we have received from Doherty, they look back at the human cases belonging to ST3 received in the past 24 weeks. On this document it looks like there is two from Western Australia, two from Queensland and one from Victoria. Is that correct?

Prof. HOWDEN: Yes. That is just a list of the samples that fit into this higher level category over 24 weeks, and then if you go further along on to the phylogenetic tree—it does not have a page number, I am sorry, but the ST3 phylogenetic tree—you will see that the non-human samples are all in red because they are highly related to each other. The Victorian human sample that is in question is in orange because it is possibly related, and the Queensland sample is in green because it is unrelated.

The CHAIR: Right. That is not on this report that we have received.

Prof. HOWDEN: Oh, okay.

The CHAIR: Great. Thank you.

Ms CROZIER: Professor Howden, I am wondering if you can help me. If the listeria was in, say, a product—one particular product in a sandwich that you tested—is it possible that it could be in some other food somewhere else? If it was in a meat product, for instance, and that meat product is distributed across the state, could that be a possibility in this scenario? Because you are only testing these samples of food that were given to you, but potentially there is this level that you have described of listeria which you said is possibly related, so you have put it into that band. Could it be a possibility that the listeria is evident in other food products across the state or even across the country, based on what Ms Patten has just described to you as well with those results?

Prof. HOWDEN: I think that is a question for the food safety people, I am sorry, because that is about the ecology of the listeria.

Ms CROZIER: Sure.

Dr BALLARD: The differences also in these isolates from other states are huge.

Ms CROZIER: Yes. But I am just wondering—even other states, but only because you have been given those samples to test—about the potential for the listeria, because we do know that listeria is present in food and there are levels that are—

Prof. HOWDEN: We cannot say it is not present in other food; that is correct. That is not our role to investigate that.

Ms CROZIER: I understand that. I understand you cannot investigate. I just wanted to know whether the level of listeria in this meat sandwich could have been also present in some other food product that is distributed somewhere else across the state.

Prof. HOWDEN: Yes.

Ms CROZIER: Thank you.

Ms VAGHELA: Just a quick one, thanks, Chair. How often do you receive samples of ham and corned beef where you see the presence of listeria?

Dr BALLARD: I could not comment on that.

Prof. HOWDEN: We would have to take that question on notice, I am sorry.

Ms VAGHELA: Because I would just like to know whether it is common to receive such samples or is it common to find listeria in these sorts of food products. I would like to know how often you receive such samples.

Dr BALLARD: We would receive food samples for investigation of listeria quite regularly—in fact every time there is a human isolate of listeria.

Prof. HOWDEN: We often do not find listeria, but I cannot quantify that, and I would say that is more a department of health food safety unit question rather than a lab question. The question you are getting to: we are biased towards the types of samples we get because they are potentially linked to cases. Just in a higher level answer to your question, we definitely get food samples where we cannot isolate listeria—yes. But I cannot quantify them.

Ms VAGHELA: I just wanted to know if you often get ham and beef samples where listeria is present.

Dr BALLARD: We get a lot of different foods coming into the lab. Do we always isolate listeria from them? No.

Mr LIMBRICK: One question just clarifying something: because we have the possibly genetic relationship between the human and food samples, that would mean that no-one could say with certainty that they are related unless they had other epidemiological information proving some sort of link, like they had eaten that food from this thing. So what I am asking you is: the genetic information alone is not enough to provide certainty; it shows that it is a possibility but it would be a requirement to have some sort of other epidemiological evidence, is that correct?

Prof. HOWDEN: Yes, I think that is a good point. It is actually easier to rule things out. So if you could say, 'Okay, this human sample is completely different to anything that's found in the food', then you could be confident. Here we are stuck. As we have said, it was possibly related, and that is a result that needs to be interpreted in the epidemiological situation which we are not privy to. In the right epidemiological context it provides good evidence for a source of disease, but as I said, that is not our call.

Mr LIMBRICK: But conversely the human samples compared to the—

The CHAIR: Professor, can I just ask you to bring it closer to you?

Mr LIMBRICK: The Queensland sample and the Victorian human sample—you could have enough evidence to rule those out as being related to each other through the genetic evidence alone, is that correct?

Prof. HOWDEN: That is correct.

Dr KIEU: Just to follow up, yes, this is only a comment: in scientific theory you can rule things out but you can never absolutely prove that it is correct.

Prof. HOWDEN: Absolutely.

The CHAIR: Thank you so much, Doctor and Professor. That was fascinating. Yes, I certainly know more than I ever thought I would know about listeria and the genomes of it. You will receive a transcript of today's hearing. Please have a look at it. It will probably arrive in the next couple of weeks. If there are any glaring errors, let us know. Thank you very much for your time. We very much appreciate it. The committee will now close so we can get our next witnesses online.

Witnesses withdrew.