Mycotoxin Matters podcast Episode #32

**SPEAKERS**

Dr. Vivi Koletsi, Martin Minchin

**Announcer** 00:02

Welcome to the mycotoxin matters podcast from Alltech mycotoxin management. As mycotoxins present an ever-increasing threat to livestock production, join us as we discuss these impacts and potential solutions, sustainable farming and our vision for a Planet of Plenty.

**Martin Minchin** 00:22

Hello, everyone, and welcome to the latest episode of Mycotoxin Matters. We are returning to the world of aquaculture today, and we're delighted to be joined by Dr. Vivi Koletsi who has recently taken on the role of global aqua technical support at Alltech. Vivi, thanks for joining us on the podcast today.

**Dr. Vivi Koletsi** 00:40

Hi, Martin. Thank you for inviting me today to this podcast. And you introduced me, introducing me onto today's podcast is the first one and I'll be happy to join and hopefully we have more podcast to do in the future.

**Martin Minchin** 00:55

Well, yes Vivi, it is your first time joining us on the podcast. So, I think for the benefit of our listeners, it'd be great if you could give a quick background to yourself. You've recently completed your PhD and were conferred with your doctorate. So maybe give a background yourself your area of study. And then coming out of that any key findings that may be of interest to our listeners today?

**Dr. Vivi Koletsi** 01:23

Yeah, that's true. I'm a new doctor. I recently graduated from Wageningen University in June 2023. I did a PhD. Funded of course by Alltech and I investigated the effects from mycotoxins on rainbow trout, rainbow trout was my model species to investigate the effects of mycotoxins and the key findings of this project it was that we highlighted the occurrence of mycotoxins in aquaculture that it was a hidden threat before we did a survey with data from Alltech's 37 Plus lab and we clearly show the mycotoxin patterns in feed ingredients, plant feed ingredients used in aqua feeds and also in aqua feed samples that they have been submitted from European location in Alltech 37 Plus lab, between 12 to 19. And also, when did in vivo experiment using rainbow trout and then we show how sensitive is the species for DON, deoxynivalenol that is the most common toxin in terms of frequency and toxicity in Europe. And also, we saw that this effect on rainbow trout are independent on diet composition, and we found additive effects of DON together with other fusarium produced toxins and rainbow trout.

**Martin Minchin** 02:50

So then, Vivi, your PhD work was primarily focused on mycotoxins and the trout species of fish. In the article that you recently prepared, you are primarily talking about mycotoxins and shrimp. And I think you spoke earlier in the blog about the significance of shrimp and the global aquaculture sector. And the growth of shrimp production and consumption. Maybe give us a bit of insight into that.

**Dr. Vivi Koletsi** 03:19

Yes, of course, because when we think about aquaculture, usually we think about fish. But I should note that the number one aquatic animal that is being farmed at the moment is shrimp. So, the number one aquaculture species is the white leg shrimp. It's very important also in terms of the volume of the production that is a very good source of protein for human consumption. And it's also important for the local communities because the species is farmed in Southeast Asia and then South America, and this generate export revenues for local communities and is very important species. And I wanted actually to focus more on shrimp production, and to see the effects on shrimp. That is the reason that we made this article.

**Martin Minchin** 04:18

It is something Vivi that I need to keep reminding myself. A shrimp is not actually termed a fish. It's a certain nuance that I guess we do come up against pretty regularly when we're talking to our aquaculture colleagues. I guess we're more customed to focusing on pigs and poultry and cows. So, we're learning a lot more about the world of aquaculture over the past few years. Vivi, your article then in particular focused, I guess on the changing diet composition of shrimp feeds, and in particular the growth of plant-based ingredients within that. Firstly, why has the industry moved? What is the requirement to move toward plant-based ingredients? And then what are some of the consequences for feed quality within that, and I guess I'm thinking of areas like be it amino acid profiles, palatability, digestibility, etc.

**Dr. Vivi Koletsi** 05:13

Exactly this trend in the aquaculture industry is of course including the shrimp feed, but also is in the fish feed that came like two decades already ago, that the industry started to switch from marine based ingredients to plant based ingredients. And the reason firstly was that the aquaculture sector was increasing and that has high demand for aquafeed. And in terms of the aquafeed production could not be sustained only if we rely on the fish meal because fish meal is the main was the main protein source that was coming from wide population. And we could not rely on the ocean and on wild fish to make aquaculture farmed fish. So, in this case, we reached at maximum capacity at some point and then the whole industry started looking for alternatives. And the alternatives was plant based ingredients. And that was the main reason actually it was about the supply. We don't, we didn't have enough marine based ingredients to supply and also, it's about the price and terms about the sustainability we cannot over fish the ocean to produce fish and shrimps. Of course it's both it's the same for fish and shrimp that this was the reason that we changed the diets towards more plant based alternative ingredients. And of course, when we change towards plant based, and we try to feed carnivore species with plant-based ingredients we have some nutritional limitations as you mentioned, one would be unbalanced amino acid profiles but okay, we can find solutions to supplement amino acids or we have anti nutritional factors in the plant based ingredients but with the processing techniques, we can overcome these problems. And lately we started also discussing in aquaculture about the mycotoxins that they are present in plant-based ingredients and actually we highlight it also through my PhD work that they are something that is present. And unfortunately, we cannot really predict, and we cannot always prevent the mycotoxins in the plant-based ingredients that we have in the aquafeeds.

**Martin Minchin** 07:47

Okay, Vivi. So, if we stay with, I guess mycotoxins specifically for a little while. What type of prevalence are we seeing? In those plant based ingredients? I know you've done a lot of analysis of the ingredients that have been submitted across 37 Plus labs at Alltech and Alltech RAPIREAD as well over the past few months. So, what have you seen within that? And is there anything notable?

**Dr. Vivi Koletsi** 08:12

Yes, that's true. We focused on the plant-based ingredients that are usually included in the shrimp feeds. And we take this data from Alltech's 37 Plus lab data, and we found there that all of the samples were contaminated with mycotoxins and first of all, we found that most of the positive samples contained more than one we have more than one mycotoxins we have called occurrence co-exposure and this is very important because we need to realise that ingredients and of course, in the final feed, we don't deal with one mycotoxin but with a mixture of different toxins. This is the number one that okay, more or less we knew that it was not a surprise if you are in this field. We have also shown that before in the survey that I have published, but for me, the most important result was the high frequency of emerging mycotoxins. We found that all in the ingredients we had a high frequency of emerging mycotoxins, and we need to explain what emerging mycotoxins are. Mycotoxins that are not detectable during routine analysis with rapid methods on the farm or in the feed mill level. And also there is no information regarding recommendation, limit or any legislation about these toxins. That for me, it was a big surprise, to be honest. And it's something that is a concern because we cannot prevent if we are not able to detect them with a quick method.

**Martin Minchin** 10:03

So, then Vivi, I think following on from your assessment of the plant based ingredients or the raw materials, you then translated that into what it might mean for the mycotoxin profile in finished feeds, maybe you'd like to explain to our listeners, how you went through that process of assessing what are essentially three different types of formulations.

**Dr. Vivi Koletsi** 10:27

Of course, yes, as you mentioned, and this survey, that we show the data of mycotoxins, it was on the individual ingredients, but we should take into consideration that to make a recipe in the shrimp feed, also in the fish feed of course, we use different plant based ingredients in different inclusion level that both matter so for which type of ingredients we have and also at which level we include in the diet. And in Alltech mycotoxin management team, we have a unique tool, the diet estimator, that gives us the opportunity to add all of this information into the tool. And based on Alltech 37 Plus lab we have the information about contamination levels, we can calculate the total risk that is called Risk equivalent quantity. This is also a unique method of Alltech of our platform, that we can estimate the total risk because as we mentioned, it's multiple toxins present. And with this method, we calculate this risk, and we use as a reference the aflatoxin B1. So, it's a unique tool that we get this information that is very close to reality. And we applied three different recipes. One is from a database that is a universal diet for shrimp feed, one from diet shrimp feed from India and one from Brazil. And there in two recipes, we found a moderate risk. And in the diet from Brazil, we found high risk for shrimp.

**Martin Minchin** 12:18

So that was potentially then interesting, Vivi, you had two moderate risk finished feeds. And then in that Brazilian formulation, it was a slightly higher risk. Were you able to identify a specific reason for that?

**Dr. Vivi Koletsi** 12:35

Yes, I tracked all the ingredients individually to see from where the risk comes from. And in the Brazilian diet. We've found that the Type B trichothecenes is a group of mycotoxins that includes DON, deoxynivalenol, was high for the ground corn. So, they used one ingredient. And that ingredient has we found high levels of DON, so that causes the high risk for the specific diet.

**Martin Minchin** 13:04

Okay, that would make sense I guess, and tally with a lot of the work that we would do across the other species and diet formulations as well. So then moving forward, a small bit, Vivi, we've established you know, there is a mycotoxin risk attached to shrimp diets across a number of regions. But if I'm a shrimp producer or fish producer, listening to this today, you know, why would I be concerned? You know, mycotoxins are my diet but what does it actually mean for shrimp producers from a be it a health or performance perspective?

**Dr. Vivi Koletsi** 13:44

Now, to be honest, for at least for them, not all the mycotoxins that we found we don't have research data about this from shrimp. So, we don't know for all the toxins, the effects but for the ones like deoxynivalenol, fumonisin, T-2 toxin that we have data on shrimp, from research, we have found that these toxins affect the growth and the health of the animal. And of course, that is translated for a loss in terms of the production and profits for the farmer. And, for me, what I'm really curious to know we saw that we found the high frequency of emerging mycotoxins and fusaric acid for example, but for these toxins we don't have any information in the literature about how these toxins affect the shrimp, and this is a new area that I think in the coming years we might know but so far, it's a black area, we don't know anything about these toxins and it's even more risky that we might have these toxins in our shrimp feed but we don't know the effects but I can predict that would be similar toxicity like the other fusarium produced mycotoxins.

**Martin Minchin** 15:07

Well I think as an industry Vivi yeah, a lot of different bodies and organisations are probably seeking to discover the same level of information on emerging mycotoxins and seeing what are those effects in the animal so, in terms of then mitigating the effects of mycotoxins in a in a shrimp scenario, Vivi, what are some of your, I guess top tips or mycotoxin control tips that you would leave with our listeners today?

**Dr. Vivi Koletsi** 15:39

Yes, as a platform, we always introduce the programme that is about to indentify the risk to calculate the risk and then to apply correction actions, like the Mycosorb product. In this case, based on the data that we found in the shrimp, in the feed ingredients for shrimp, we found emerging mycotoxins and, in this case, we cannot prevent in the feed mill. So, the first step to identify the risk we cannot measure, it's one type of toxin that we are not able to detect with a rapid method. So unfortunately, the first step is not really applicable in this case. To calculate the risk is only based on data that we have from Alltech 37 plus lab, but I would advise for example, any shrimp feed producer to be at the safe side, and to be on the safe side to fight against these mycotoxins that potentially are present in the shrimp feed, of course, is the supplementation of the Mycosorb product that binds a big range of mycotoxins including the emerging mycotoxins, so it's like a mitigation, but at the same time, the only prevention strategy that we can offer for this type of toxins.

**Martin Minchin** 17:06

Well, thank you Vivi, it's great to have you on the team. And I think as you get yourself stuck more into the topic of mycotoxins and aquaculture and continue to do more and more work; we'll probably have you back on the podcast in future to discuss more of your learnings. So yeah, thanks again for joining us today. We're excited to have you on the team and to our listeners. Once again, we hope you've enjoyed today's conversation with Dr. Koletsi. If you do have any follow-up questions, feel free to contact any of the Alltech team and they'll be able to point you in the right direction, or else visit knowmycotoxins.com and you'll be able to find a wealth of information there also. And then we'll be back next month with another special episode of Mycotoxin Matters.

**Announcer** 17:57

We hope you enjoyed listening today and look forward to you joining us next time on the Mycotoxin Matters podcast. For more information on the topics discussed, please visit knowmycotoxins.com That's K N O W mycotoxins.com