Mycotoxin Matters podcast episode #29

**SPEAKERS**

Dr. Radka Borutova, Hazel Rooney, Martin Minchin, Announcer

**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 back to this month's episode of mycotoxin matters. Today we're looking forward to exploring more about the interaction of mycotoxins and pathogens in pigs. Individually, there has been a lot of research done on both mycotoxins and pathogens in animals. But up to now, there's only been limited work that focuses on their interaction together. To help us understand more. We're joined today by Dr. Radka Borutova from Alltech's mycotoxin management programme, and Dr. Hazel Rooney, from Alltech's gut health team. Radka, you've joined us quite a bit and you'll be familiar already to many of our listeners. Hazel, I think it's your first time joining us today. Before we start, maybe you could give us a quick introduction to yourself and some of the areas you focus on at Alltech.

**Hazel Rooney** 01:06

Thank you, Martin. And thank you to the whole mycotoxin team for inviting me on today's podcast, really looking forward to this episode. So as Martin said, my name is Hazel Rooney, I have been with Alltech just a little over two and a half years. So, I'm based here in Alltech Ireland, and my role is I'm the key account manager responsible for our Irish pig business. And then I'm also our European technical support for our European pig teams. So, I kind of work in a range of areas like nutrition, health, management, welfare, and I get to travel around and see all of our different colleagues across Europe as well. So really exciting role and everything's going well so far. So hopefully for a good year ahead.

**Martin Minchin** 01:49

Brilliant. Well, it's good to have you on. Radka, we'll start with mycotoxins. And I know you put a lot of work into preparing the article. So, you did analyse within that I guess some of the mycotoxin data related to swine finished feed globally. Maybe you could just give us a background into what that data is telling us now as regards what is the risk for pigs. And is there anything interesting within that?

**Dr. Radka Borutova** 02:20

Nice to be here again, Martin. Yes, we can go through, shortly through the data. For the first three to four months as I will refer to worldwide data looking at the finished feed for swine involving growers, finishers, sows, gilts, and nursery pig’s feed. When we look at the data from Alltech 37+ lab, we can see that 98% of all samples analysed at 37+ lab, we could see there were two to three more mycotoxins on average per sample and more. So we talked about multi mycotoxin contamination of these samples. Of course, that's a known fact, on average, there were seven almost seven mycotoxins per sample observed when we look at these results, which is a little bit alarming situation. The most prevalent mycotoxins were indeed emerging mycotoxins, but they don't contribute that much in the risk, the most risky group of mycotoxins. So, when you look at the risk equivalent quantity metrics, then it would be Type-B trichothecenes where we have our usual suspect deoxynivalenol, which is causing the greatest risk to all our finished feeds for swine. So, I would say the overall risk for sows, gilts or even the gilts and finishers would be moderate to high and that is mainly coming from type B trichothecenes and multi mycotoxin contamination of diets.

**Martin Minchin** 04:01

Radka, in the article, I guess, to demonstrate that risk, you use the term risk equivalent quantity or REQ, would you be able to tell our listeners in one sentence, what REQ is?

**Dr. Radka Borutova** 04:13

Simply REQ is risk equivalent quantity as you said, but it helps us to understand the link between mycotoxins and the animal performance. And it's basically an evaluation of the total toxicity of a given mycotoxin mixture based on the number of individual mycotoxins in reference to the aflatoxin B-1, so we assess the risk for different animal species and different animal categories with basically one number which is always a number per like a concentration in relation to the aflatoxin B-1 toxicity.

**Martin Minchin** 04:49

Hazel, Radka has given us I guess the introduction on mycotoxins. We're also going to talk about pathogens today, which falls into your area of expertise. In the article I guess salmonella and E. coli are referenced quite a bit as being problem pathogens in pigs. Would you be able to give us a brief background on both of those pathogens? Maybe, how prevalent are they within pig herds? How big of a concern are they for producers and why they're controlled is so important?

**Hazel Rooney** 05:18

So, this was from a pig producer standpoint, and Salmonella and E. coli, they really are two of the biggest concerns in terms of pathogens for pig producers. And that's not only in Europe, that's right across the globe. And it's something that we're always trying to keep under control on the farm, so if we just even start off with salmonella, and so this is a type of bacteria or pathogen that can multiply within the animals intestine and then lead to Enteric Diseases, and it's quite similar to mycotoxins in the fact that there's very specific categories or serovars of salmonella can have a greater or lesser influence in specific animals. But when we actually look at the pig industry and just focus on what's affecting pig producers, it's really salmonella typhimurium, and salmonella Derby are the two that represent the greatest level of risk to animal health. And when we think of the kind of signs I suppose that are associated with salmonella, it's really to do with diarrhoea, is what you see when you've got salmonella presence in the pig herd. So luckily, most countries have quite strict legislation on salmonella presence. But it is something that we always need to be mindful, and you know, continuous testing on farms to detect if you do have a salmonella issue, then on the E. coli side, and it does present quite similar effects to salmonella, in that the clinical signs are things like diarrhoea, and we see a lot of dehydration and shivering in some cases. And it is a frequent challenge on many pig farms. And in terms of the kind of animals that are most affected by an E. coli challenge, it's mostly in the nursery and the postweaning phase, are the kind of two high risk periods for an E coli infection. And a lot of our listeners might be aware today that the EU has brought in a ban on the use of therapeutic levels of zinc oxide. And zinc oxide was one of the key tools that pig producers used to have to manage that postweaning diarrhoea, that was caused by E coli infections, and but as of June of last year, we can no longer use those high levels of zinc. And we now have to try and find more natural and alternative methods to controlling postweaning diarrhoea in our piglets. So just another challenge that pig producers now have to try and get under control over the next couple of months.

**Martin Minchin** 07:05

Hazel, Radka's obviously given us a very, you know, specific overview of the mycotoxin presence in finished feeds. Is it possible to quantify you know, how frequent the challenges related to E. coli or salmonella in pig herds? Are you able to shed any light on that, from your own experience working with producers or just general background?

**Hazel Rooney** 08:07

I mean, we would see E. coli in nearly all the units, it's not always a case that they're presenting clinical signs a lot of the time, particularly with salmonella, it's this subclinical salmonella, that's the most common presentation, and the most common problem experienced by the majority of pig herds. So, although your pigs might not be showing visible signs of an E. coli or salmonella infection, a lot of the time there is still clinical cases going on the farm. So, it's extremely common. And it's definitely an issue that's being seen, like I said, across the globe, and something that we feel always really, really mindful of.

**Martin Minchin** 08:43

And being mindful Hazel, is it fair to say that I guess the food safety and the food chain is where a lot of that concern comes from around the human consumption of contaminated meats?

**Hazel Rooney** 08:53

Yeah, 100% It's definitely a huge concern on the human side. So, you know, if you take salmonella, it's a really important zoonotic pathogen, and it's also one of the main causes of foodborne outbreaks and infections in the European Union. And it's the same thing when it comes to E. coli, we get a lot of food poisoning caused by exposure to E. coli that can lead to diarrhoea, fever and stomach cramps in humans, and while thankfully, these cases are rarely fatal, they can be extremely unpleasant for people. And usually, recovery takes a couple of days to get over that. So, for salmonella, like I mentioned earlier, there's a lot of kind of legislation in place and control programmes in place as well to try and keep those levels low. And so, if you take the UK for example, the Food Standards Agency carries out a close monitoring of all the abattoir test results. So, they will test pigs when they go to the slaughterhouse. And any action is taken if the equivalent of 6% salmonella presence is detected. So, they're really trying to reduce the risk of any zoonosis or foodborne outbreaks occurring due to salmonella and E. coli infection in our pigs before it gets into the food chain.

**Martin Minchin** 10:03

Thank you, Hazel. Radka, I guess now we've looked at both mycotoxins and pathogens individually, we may move along to the interaction of those in the animal or pigs specifically in this case. When you looked at the literature on this, I guess, you know, is it fair to conclude that looking at the frequency of both mycotoxins and then what Hazel outlined from a pathogen perspective, is it fair to conclude that they do coexist in most cases on pig farms globally?

**Dr. Radka Borutova** 10:34

Yeah, when I listen to Hazel, they definitely do. Because we find mycotoxins in every feed. It's just a question not if, but how many and what are going to be the combinations? And the problem with mycotoxins and in combination with salmonella or E. coli is the mycotoxin, or ingestion of mycotoxins leave the pigs or lead to higher susceptibility of pigs to those diseases. As well as the bacteria there is also viruses, it's also parasites, but on the other side, salmonella, E. coli and other diseases. They also are opening the door for mycotoxins because they also cause inflammation and destruction of the enterocytes. And we know 70% of the immune system is located in the gut, and that's where it comes from. So on one side, mycotoxins are opening the door for salmonella and E. coli, and on the other side, salmonella and E. Coli, they can also destroy the good bacteria like lactobacillus, Bifidobacterium, but also cause inflammation of the gut and increase the passage of mycotoxins through the intestine. So it's worse both ways. And I would say just shortly summarise how mycotoxins open gates for bacteria, because could be interesting to understand these. It's the first everything goes through the guts. Everything starts in the gut, mycotoxins they can cause the gene mutations inside the inter sites. They can modify the inter cell microflora as Salmonella and E. coli do as well. They also alter the composition and the production of the mucus, which is protecting the gut lining, and very importantly, mycotoxins they increase the grass epithelial passage of bacteria, aluminum antigens, due to the transcellular passage or they increase the transcellular passage because they have an impact on the tight junctions, such as proteins, which are connecting the intestinal cells. And also they modify the secretion of pro inflammatory cytokines. They also increase the production of IGA and so they stop the balance between T helper one and T helper cells. That's the direct immune system response, not talking about the impact of mycotoxins on the vaccination response. So, very, very short summary how mycotoxins can open the gate for bacteria. Like we have to also think the other way, bacteria can also open the gates for mycotoxins.

**Martin Minchin** 13:17

I think it is interesting and both of you have said it. Radka, I guess and we think from a mycotoxin perspective, we normally think of how mycotoxins create a greater pathogenic risk, but I think even in the article and you have both said here, it can often work in reverse where pathogens are leaving the door open for a heightened mycotoxin problem in the animal as well. So certainly, something for people to be aware of. Hazel, you know, looking through, I guess, again, the research on this, would you think you know, what is the extent of the research in this area of the interaction of pathogens and mycotoxins? Are there gaps in the research? Do you believe from your experience this is something that the industry should be looking at more?

**Hazel Rooney** 14:04

Yeah, I definitely think although Martin, you know, there is a huge amount of research and information available, looking at the synergies between these two, I think there's always more room for mycotoxins. Especially, you know Radka spoke about in the past about these emerging mycotoxins now that we're learning more about and more information is becoming available. And I think as we start to learn more about those mycotoxins that's going to warrant more research being done in this place. And same on the pathogen side, you know, we're always learning about new diseases and disease challenges in pigs. So I think if you can do more research that's looking on how pathogens are going to increase the mycotoxin challenge, and vice versa. If there's a high mycotoxin load in the feed, how does that then increase the prevalence of introducing pathogens on your herd so I think it's definitely an important area and hopefully more research is going to be conducted on this in the coming years.

**Martin Minchin** 14:57

I guess we've gone through the interaction, and what it's leading to in the animals, as we move toward a wrap up, from both of your perspectives interested to hear, you know, how are we seeking to control both of these issues on farm? Is that a combined effort? Are there other opportunities? Should it be a combined effort, I guess, or are we doing things individually?

**Dr. Radka Borutova** 15:21

Yeah, it's a definitely combined effort. I think Hazel can summarise it from her perspective, I will go through the mycotoxin management very quickly. It's basically the successful mycotoxin management, few important steps. First, we have to identify the risk. That's what we are doing when we were starting the entire discussion today we were talking about the REQ, we're talking about knowing which mycotoxins are the most prevalent ones, which mycotoxin combinations are doing what kind of risk that's the first. So identify the risk, test your samples. The second one is the risk quantification. And the last one is the risk mitigation with the help of the mycotoxin binders. The activators. In my opinion, that would be the three major steps to control the mycotoxin risk. And of course, then, I think Hazel can summarise how we can control the environment and the everything from the perspective of the diseases, the bacteria and the viruses, parasites, whatever.

**Hazel Rooney** 16:29

Absolutely. So, I suppose from my side, when we're working with pig producers, it's so important to have a robust biosecurity in place that's going to address both your external and your internal biosecurity measures. And that's really, you know, if we have a stringent biosecurity protocol in place, it's going to avoid the introduction of new pathogens, but then also limit their spread, which is going to contribute to increased wellbeing of your pigs, the quality of your farms, and it's going to contribute to public health as well. So, we focus on biosecurity and we look at things like having adequate site security, and ensuring that all your farm staff and visitors are sharing in and out of the units. You know, you've got strict routine hygiene procedures for things like your boots, your clothes, hand washing and all the farm equipment. And it can come down to things like operating very strict, all-in, all-out pig flows. So biosecurity will be the first step we do a lot of work with veterinarians and the farmers themselves to put those programmes in place. And then we also look at the wider approach of also improving the overall health of the pig herd and the piglet immunity as well. So through a lot of our technologies and things like Actigen that has a really beneficial effect on increasing gut health and development, and also an increase in piglet immunity. So, when those piglets have a more established immune system in place, they're going to be better able to cope with those challenges that we see with that kind of E. coli infections and that post weaning diarrhoea around weaning time. We know as well, Actigen obviously has a very positive effect on gut health and performance. So we're seeing the beneficial effect in terms of the piglets are more robust, so they can withstand those challenges. But they've also got a healthier gut in place as well. So, we see better nutrient digestion and absorption, which leads to the better growth performance. So, it's kind of taking that holistic approach and how we can manage those pathogens. And for me, personally, I think it all comes down to biosecurity first, and then looking at improving the overall health and immunity of your herd.

**Martin Minchin** 18:32

Radka, Hazel, thank you for sharing the knowledge and expertise with us today. It's great to be able to get I guess, a perspective from people who are working directly with producers each day in terms of how they are navigating the various challenges around both mycotoxins and pathogens. Radka and Hazel have only given us, I guess a quick snapshot of the topic. If you as a listener would like to read more or find out more, the full article is available online at knowmycotoxins.com along with a wealth of other information related to a wide range of topics there. So go on and feel free to have a look. And obviously, Radka and Hazel will be more than happy to answer any more questions you may have. Just feel free to get in touch with us there. Thank you all for joining today. And we'll be back next month with another episode of mycotoxin matters.

**Dr. Radka Borutova** 19:28

Thank you.

**Hazel Rooney** 19:30

Thank you.

**Announcer** 19:32

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