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Food Safety in the Digital Age

An Exclusive Interview with Elisma van Zyl, Food Scientist, and Microbiologist

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Franzisca Gartenmann, Marketing Manager at NEMIS Technologies:

Hi Elisma, thank you so much for taking the time to share your take on food safety in the digital age. Let me start with a simple question: how modern is modern food safety?

Firstly, I must state that I am neither a computer nor a data scientist. My opinions and views are based on my observations and experience with implementing new technologies and systems; what has worked and what has not. When we think of something modern, we refer to something relevant or used right now. I would argue that food safety principles aren't modern but are timeless, untouched by what is going on in the modern world right now. These principles include, for example, that you cannot have more than 100cfu/mg of *Listeria monocytogenes* in certain final products, that allergens must be declared, and that packaging should always be intact. **We remain obliged to ensure the safety of our customers and, thus, the safety of our products, regardless of what is going on around us. But how we approach and control our processes is something that changes over time.** That being said, modern food safety has gone from reacting to incidences to preventing them. There are enough tools, information, and knowledge to prevent outbreaks from happening. "I didn't know" is no longer a valid excuse. The food industry is implementing a variety of modern techniques. Cloud computing ensures suppliers, consumers, and producers have the same set of information at all times. The internet of things allows you to sit at your computer and just watch your entire production process run. Everything is connected to everything. We have so much more visibility and transparency through real-time information in the food factories. Augmented and virtual reality will be an even more significant leap, much of which is still being developed and improved now. But in the future, these technologies will become much cheaper, and we will see auditors doing their job virtually with someone walking around the factory with a camera. Furthermore, AI is now looking at our data. We now have the ability to mine data as food production factories are essentially just big data mines. Food safety is relatively modern, but I think there is still a significant barrier to entry for modernization. Many technologies are available but whether they are accepted and implemented by the industry is another question.

On the other hand, when it comes to modern food safety, the power of social media and mass communication should play a critical role. If there is an outbreak in Spain, I will read about it the very next morning in the UK. Companies have had to become quite transparent. They connect with their consumers directly, and I think that is a very modern thing. They now have the ability to directly educate their consumers in terms of a recall or simply on how to safely use their product. So on a positive note, educating consumers on food safety and handling products is a very modern move.

There are a lot of technologies available. But there is still a big gap between what is available and what is done. If you were consulting a customer, what would you recommend they focus on in modernizing their quality management?

There is no one-size-fits-all in food safety. Therefore, I would start with looking at a customer's specific situation and manage the improvement from there. So, if they are currently still using pen and paper, I would suggest moving to an excel file. If they are presently logging their results in an excel sheet, I would move to a digital platform that can interpret the data. Let us take environmental monitoring as an example. Countless samples are taken and logged into an excel file that just sits on someone's computer until an auditor comes by. A straightforward but valuable step is to look at the results and try to figure what they are telling you. What can be learned and derived from the data? Furthermore, I would recommend automating the most repetitive manual tasks like temperature and pH measurements. In that way, you can free up so much time for the team. Instead of having a technologist monitor temperature for half a day, you could automate that and have them do some root cause analysis instead. **You don't need AI in your factory; you just need to start using the data you already have.** Above all, it is paramount that companies include their operators and staff in this transformation. Manual jobs should not simply be automated without expanding and adapting the workforce's competencies to the changing circumstances. It is imperative to remain responsible during these times, to your employees and, of course, to your consumers.

What do you think are the challenges and pitfalls of digitalization?

The first and biggest pitfall, like everything in life, is that you get swept up in the moment. You invest both money and time in some data management that does not work for your processes. Then you are stuck because you cannot backtrack from that. So make sure your selection criteria are based on what is of most value to your specific factory. **The second pitfall is to overestimate the seeming intelligence or smartness of your tools.** Digital tools are stupid because they will only give you the information you have taught them to provide you with. It will not think for itself, well not yet anyway. Remaining present in your factory is paramount. If you automate your temperature probes, you still have to go

and check on your fridge. If not, you will most likely not see the water on the floor around it or the smell of the horrible air when opening it. People think that implementing some fancy tech equates to controlling your processes – that is a big misconception. The generation of massive amounts of real-time data does not ensure the safety of the consumer – the interpretation and subsequent corrective actions do, something that cannot yet be automated. **And lastly, one big challenge of modern food safety is, in fact, the safety of the data.** We do not only store massive amounts of data, but some of it may even be incriminating. Before we focus on mining the data, we need to think about where it will be stored and how it can be protected. Nonetheless, we cannot be scared of generating data. Generating no data is much worse than generating "bad" or "negative" data and doing something about it.

How has the internet as some sort of self-service platform changed food safety?

There is good information that is usually drowned out by opinion pieces, incorrect interpretation, and blogposts in any sector. Government and advisory bodies have done a fantastic job in putting reliable information out there. Validated experts have been given a big platform to share sound advice through the dawn of webinars and online conferences. A couple of years ago, you had to pay a ridiculous amount of money and travel far just to listen to somebody talk about an issue you might or might not have. Now, you receive the same information during your lunch break. Since I will not diagnose myself with a terminal illness based on a blog post, I can use that information to ask my doctor the right questions. The same applies to food safety. The internet has expanded the possibilities on how to educate yourself. Yet, we need to stay with the scientific process of double-checking our sources.

Elisma van Zyl delivers support to food manufacturers in the EU and South African regions through short- and long-term partnerships in *Listeria* control and management, plant rehabilitation, and tailored cleaning and sanitation programs. As the founder of Elute Solutions, she is working to accelerate the 4th industrial revolution in Food Safety management and training. She is also pursuing her Ph.D. in Food Science, focusing on *Listeria monocytogenes* genomics and its role in traditional detection methods.