DAY 2 – Chemical Mixtures

Questions for **Armando Venancio:**

Serhii Kolesnyk: at best of your knowledge, are there any strategies available to perform some kind of detoxification of food or feed?

Armando Venancio: There are strategies published to remove or destroy mycotoxins. However, I want to ask your attention to two previous points:

1. If we want to detoxify food or feed is because we have allowed fungi to colonize and accumulate mycotoxins in our food and feed. Prevention should always be the key, and not remediation. Obviously, if prevention fails … we face either remediation or food losses!
2. The second point is regulation; one should start processing with good raw materials, complying with legislation (regulation). There are legal and ethical concerns if you want to detoxify crops to make them compliant with current regulations. In some cases this is not possible, I will give you two examples:
    a. Aflatoxin M1 in dairy products. EU regulation states that milk used for dairy products should comply with defined regulated levels. So, it does not matter if you can remove the toxin during processing, since regulation states that your starting raw material should be compliant
    b. Ochratoxin A in wine. EU regulation states that OTA in wine should not exceed a certain value; but there is no limit for grapes. In this case, you may develop strategies to reduce OTA during processing, in order to end with a wine complying with regulation. Your strategies may be (i) using an enzyme cocktail in grape must preparation that besides pectinolytic activity, might also hydrolyze OTA; (ii) using an adsorbent to remove OTA while clarifying wines; or (iii) using an yeast for alcoholic fermentation, or a bacterium for malolactic fermentation which might also exhibit hydrolytic activity against OTA. So, you may find ways to produce your wine that will in parallel reduce OTA as well.

Concluding, there are some strategies that could reduce mycotoxins levels without affecting the commodity. These strategies have a limited effect in most cases, meaning that we may not handle high concentration of mycotoxins. E.g., we may reduce OTA levels in wine, but we will not be able to produce wine from rotten grapes …!

In some food industries, regular processing will have an impact in mycotoxins, reducing their level; but be aware of modified mycotoxins …

On the other hand, if we look at this from a food security point of view, you may need to detoxify to feed our growing population.

Marco Hatem Vaquero: Just a Naïve question. Do they have the same consideration both antibiotics and mycotoxins as secondary metabolites of fungi in the food safety assessments? Thank you so much.

Armando Venancio: During the Summer School I handle this question in a different way, but now that I read it, I will give a different answer.

As far as I know, in food safety assessments, antibiotics are not handled as fungal metabolites produced in crops. Antibiotics are assessed as indirect exposure due to the consumption of animal products. These are commercial antibiotics, not always with the natural structure produced by fungi. Nevertheless, some antibiotics are produced by fungi in crops, and some of our current mycotoxins have been previously studied as possible antibiotics.

Questions for **Bruno Dujardin:**

Marco Hatem Vaquero: What is the statistical criteria in terms of sample size and variability of sample? Thank you so much.

> **Bruno Dujardin:** The minimum criteria for the sample size depend on the distribution parameters to be calculated. To calculate an average, for example, a sample size of 5 is considered sufficient. For the 95th percentile, however, a sample size of 60 is needed. Further information on this topic is available here.
>
> In terms of sampling variability, we do not apply fixed criteria when performing exposure calculations.

Rossana Roila: In your opinion the Deterministic approach for eposure modelling will be obsolete sometime soon and therefore unapplicable?

> **Bruno Dujardin:** No. Deterministic models can provide very good exposure estimates, in particular for chronic exposure assessments. Considering that probabilistic methods are more resource-intensive, they should only be used when they provide a clear added value (e.g. imputations methods, quantification of uncertainties, etc.).

Vèronique Sirot: Thank you for this nice and very clear presentation! My question deals with occurrence data. For probabilistic assessment, data on multiple chemicals on a same food sample are needed. Monitoring plans are often independent for the different chemical families (e.g. pesticides vs heavy metals). It seems not so easy to get concentration data in a same food sample. How do you manage this limitation?

> **Bruno Dujardin:** EFSA did not yet implement risk assessment of combined exposure to multiple chemicals across regulatory domains, but this is indeed one of the issues that will need to be addressed in the future. Whereas separate data collections were previously organised for the different regulatory domains, EFSA has now implemented a single chemicals data collection across regulatory domains. This will allow data providers to better report samples that are analysed for different types of chemicals. However, further work is still needed with European Commission and Member States, to ensure that monitoring programs are better coordinated across regulatory domains.

Anas Shaikh: Is there a graphical user interface based platform of predictive models for chemical mixtures such as Combase which is available for pathogens. Another question,

are there any virtual collaboration/internship platforms to learn and contribute to the predictive risk modeling efforts with EFSA so that students can learn by doing it?

> **Bruno Dujardin:** Different platforms have been developed with different degrees of complexity. The Danish Technical University (DTU), for example, has developed an online calculator that is very straightforward (here), whereas the Dutch National Institute for Public Health and the Environment (RIVM) has developed a more advanced platform for Monte Carlo Risk Assessment (here). In order to increase participation of all interested stakeholders, EFSA will explore opportunities with RIVM to make their platform more transparent and accessible to all stakeholders.