Risky Business: Food Safety Concerns in Agricultural Development

Webinar Q&A Transcript

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Angela Records: At this time, we'll move into our question and answer portion of the event. So just looking at some of the questions that we've noted throughout the session the first question I think will ask will go to Ahmed. So this question comes from Marjatta Eilitta and she's commenting on an ounce toxin per food. And so there was a lively discussion in the chat box about your theory about increasing food diversity and how that would increase food safety risks and people were discussing, comparing that to the risks associated with a single food sourced diet in which mycotoxins are an issue. So Marietta is wondering if you can comment on any evidence or data about the risk increasing associated with increasing diet diversity.

Ahmed Kablan: Thank you and thank you Marietta for the question. I saw this discussion. It was very interesting to hear from different folks. And yes, if we look at a single risk increasing diet diversity you are reducing the amount consumed from that food that is contaminated. For example, from the article back to the same researcher that Dr. Harvey sited, Dr. Fisher that she looked at in 2011 publication where she looked at the how we can reduce the risk of aflatoxin and diet diversity is one of them because you have certain foods that inhibits the enzymes convert aflatoxin D1 to the carcinogenic afloxide. There is – so there are environment inhibitors.

There are some foods that they will bind with aflatoxin and by work into ____ they will be excreted in the stool so you are not getting it inside. So we are reducing the risk of aflatoxin. But at the same time the importance diet diversity goes back to the third or fourth slide that Dr. Delia Grace presented where she looked at again the evidence was still as one of the points that as I say we need to generate more evidence. But still with the produce, animal source food and fruits and vegetables those are the ones that are at a higher risk of introducing food borne illnesses from the microbes.

So if we are looking at aflatoxins and mycotoxin or aflatoxin in particular increasing diet diversity you are reducing the risk of exposure but also you are adding let's think mycotoxin not only aflatoxin. You have ____, fumonisin, zearalenone, T-2 etcetera and each of those toxins they are or they could be introduced from different kinds of foods because different foods of course are targets. At the same time let us think if we don't have a proper use and handle for the different kind of either ASP, animal source product or fish or chicken, poultry or fruit and vegetables then you are introducing the other risk factor which is the microbes and from Dr. Havelaar article or publication that he looks from the WHO you can see microbes are the high threat. And I think we have Dr. Havelaar with us on the presentation with us here who can comment or add to this discussion. Thank you.

Angela Records: Great. Thank you very much Ahmed. The next question that we have here is coming from Ruth Agius and this is in reference to specifically in mycotoxins and aspergillus. The question is for Dr. Harvey. The question is what feeds off of aspergillus and Ruth is wondering if the corn can be fermented to kill the aflatoxins or preserved in some way. And she knows that there are traditional methods for killing pathogens and just wondering what can be used to deal with the aspergillus. Dr. Harvey?

Jagger Harvey: Great. Thanks very much Ruth. That's a very good question. So there are kind of two aspects. First of all, what do you do with the fungus that's grown and contaminated and then what do you do with the toxin that's been produced by the fungus. So by getting rid of the fungus before you store it for longer then you can avoid further contamination and there has been some work on this. So for example there's a paper out from the University of Queensland and a Tanzanian scientist where they used extracts from plants that can be grown on farms and taking fairly simple extracts from that and then treating the grains that kill the aspergillus fungus.

So it's something like that potentially at or shortly after harvest you could kill the fungus and then avoid potentially further contamination downstream. There's also been a lot of research on different chemical ways that you can decontaminate and get rid of the toxin itself. It is a fairly stubborn toxin. It's stable at high temperatures. Studies have looked at fermentation and essentially not seen much change at all in the amount of toxin.

So in terms of chemical decontamination for example in Mexico there's a practice of adding lime and heat to corn to make tortillas. So with that you do see degradation of the aflatoxin so you can look at, that's called nixtamalization adding alkaline media during food processing. Also there is ozone treatment so ozone is not toxic. It can be produced with a fairly easy generator. There's also ammoniation so by treating with ammonia. That's used a lot for example in Senegal to export peanut or ground nut type products in Europe. That can decontaminate aflatoxin. And so when you're looking at degrading the toxins you just have to be careful that what you're turning them into you're not producing another compound that you're missing that's also toxic or that they can revert back to the actual original toxic form.

And then people are also looking at biological ways of decontaminating so which microbes could you add to the fermentation processor? Are there processes that could get rid of these toxins or the fungus as well? And I think Ruth, considering the context of where people have to apply this out in the real world and in developing countries that we need to really look at critically at which of these technologies we can deploy so that we can get rid of the fungus and the toxin. Thank you.

Angela Records: Great. Thank you. Thank you, Dr. Harvey. Ok. So our next question is for Dr. Grace. So this comes from Roger Day and he noted that his impression of in Africa that food safety issues are perceived mainly as relating to market access in developed countries. And he notes that he's heard that in Africa it pays more to pay attention to the food safety or safety of food that's being exported to Europeans than it does to pay attention to food safety for Africa's own people. So he wonders if we can find ways of moving food safety up the agenda in relation to local markets in Africa. And I wonder if you can comment on that Delia?

Delia Grace: Yes. I mean I think it's true observation that food borne disease has not been high on the priority in Africa. I would say in some other developing countries – I gave the example of Vietnam but also China, it is already quite high on the agenda but not so much in Africa. I think the reason behind that is until this landmark study by the World Health Organization we didn't have good evidence of the burden of food borne disease. So they say with policy makers, good numbers trump bad numbers and bad numbers trump no numbers. I think the fact that we didn't have these estimates of

food borne disease meant that policy makers were – it really wasn't on their agenda. And now that we have these estimates it's probably going to start being quite a bit more important.

But then the other thing which we hear in food safety worlds is that while the human burden of food borne disease is important for getting attention if you want to get real attention you also have to come in with the economic data. You also have to come in with dollars and that's when the ministry of finance starts listening. So I think one of the ways and one of the areas of research at the moment is to try to build on the evidence we have, get better evidence, present this to the decision makers and to the public and then hopefully this problem will get some of the attention it deserves. Thank you.

Angela Records: Great. Thank you very much. So our next question is from Maryam Rezaei and she's asking apart from the aflatoxin problem and pesticide residue have you ever encountered other food safety problems that leads to qualitative and quantitative post-harvest loss of food commodities. So I'll pose this to you Dr. Kablan.

Ahmed Kablan: Thank you, Dr. Records. I think if you look at the presentation that Dr. Grace presented you'd look and if you go and read through the WHO report you can see the risk for food safety concerns other than aflatoxin that are presented there. And there's a really high risk and the cost of those in terms of the human life and in terms of the economical costs is very high.

Angela Records: Ok. Thank you, Ahmed. So the next question is for Dr. Harvey. Marjatta Eilitta asks what are problems associated with mixing of cereals with higher aflatoxin content, mixing those with cereals of lower content immediately prior to use in order to have the cereals with acceptable average aflatoxin content?

Jagger Harvey: Great. Thank you very much. Yeah. So this is something that's used in some countries and is worth consideration in different contexts. So when you mix you essentially take something that has higher levels of the toxin, you dilute it out into parts of the harvest that don't have as much toxins so that on average these stay below the maximum allowable level. So one thing that needs to be considered here is how those maximum levels are set. So in the U.S. and Europe for example people don't eat nearly as much maize as they do in parts, other parts of the world where people can consume half a kg of maize a day. So in addition to the maximum allowable levels we also have to look at the total consumption of what people are taking in.

Also we need to look at other things that can be done kind of related to that as well so mix in binders for example. So there are certain clays that when you mix it in when for example livestock consume the contaminated product they don't get exposed to the toxins. But essentially what it boils down to is making sure that as researchers in our projects and any baseline information that we're setting that we involve people like Morris Juma who's on with us today and listening in and really people from the ministries, people from the government and the private sector so that they can consider in their own context looking at food consumption patterns and the markets in their own countries. How can we best look at the array of possibilities including mixing?

So for example in Kenya the cereal miller's association has worked with ____ and Texas A&M for testing their trucks when they come in. And now they estimate that they're reaching about 50 million people with tested low aflatoxin products. So again if by engaging the national partners and the people in the systems that's what we really need to consider things like mixing in the appropriate context. Thank you.

Angela Records: Ok. So our next question is from Arie Havelaar and this is for Dr. Grace. So the question is how can we better link the public health and agricultural communities and emphasize the needs of good surveillance to start understanding the magnitude of the problem and the causal pathways?

Delia Grace: Yes. Thank you. And I would say that one of the best ways of doing that is to generate evidence and to study which of course Dr. Havelaar published, that sort of publication last year is one of the very first ways of getting better understanding and appropriate concern around food borne disease. But more broadly I think one area we could leverage is this whole area of one health, eco health. That has rose to prominence in the global community with the avian influenza, MIRS, these zoonotic diseases which have a great human health and economic impact.

And at the moment there's a tripart arrangement between the world animal health organization OIE, the World Health Organization and the Food and Agricultural Organization to work together in the umbrella of one health. But so far food borne disease has not been necessarily considered as a very, as a one health type problem. And yet as I said if you look at the great burden of known food borne disease comes from the animal source foods.

More than half of the pathogens involved in this latest ranking of the top pathogens involved was ___. There are many elements of it which really make it fit well within the one health, eco health framework. So I think that would be one way because this is already a bridge. This is already a way of bringing together the human health and animal health agricultural communities. So if we could leverage that more that would be one opportunity. Thank you.

Angela Records: Great. Thanks very much. So the next question touches on a little bit on something that we previously discussed but I'll ask. This is a question from Jennifer Lapin and she wonders how international trade figures into food safety impacts in low income and low to middle income countries studied. So Delia do you have anything additional to add to the topic of trade and how that's relating to food safety.

Delia Grace: Yes. I mean I will say it is an under examined area because partly because food safety itself is only recently rising up the agenda and then the aspect of trade has not been well addressed. But there was a book published last year by the World Health Organization which is available, freely available online called Trade and Health towards building a national strategy and I was one of the chapter's co-authors. So that does cover some of this background between trade and health.

In short, of course Africa in particular is now a net food importing country and it appears that on the whole food imported into poor countries is safer, is better at meeting the standards than food which is actually being produced for domestic markets in poor countries. But at the same time there is a small but problematic pattern of

dumping unsafe food in developing country markets. And we saw this with myelin in milk when it had already been kind of discovered in China and had been removed from the Chinese domestic markets and it was still being found in markets in Africa.

So on the whole, food which is legally imported from true developing countries is not a major problem for food safety. But there is this small criminal element who are actively dumping unsafe foods in developing country markets and that needs to monitored and prevented. Thank you.

Angela Records: Great. Thank you very much. So our next question I'll pose to the panel and see if anyone has this experience. So Angela Kraszewski asks if anyone has had experience with the consumer demand side? So any interventions that have been developed that would improve food safety buy there's just no, little to no demand for the products. Can anyone speak to this?

Delia Grace: I've just been speaking but I will quickly talk about this one because it is a question we have addressed. And basically whenever we do these value chain analyses we find that there is a niche market in domestic, in developing country domestic markets for higher quality foods be it organic, be it kind of coming from special value chains and around – it varies from 5 to 15 percent of people are purchasing this, paying a premium and they are getting safer foods. But it appears that for the mass markets people are unwilling to pay that premium.

The interesting thing is that when we do economic studies willingness to pay practically everybody 80 to 90 percent of people in developing countries say that they would be willing to pay for safer food. But there seems to be two problems. One is they don't trust that the foods being marketed as safer really is safer and usually they're correct not to trust that. and secondly that poor people in the long term they are highly driven by price so that if there is higher quality food being offered at a premium there will be demand from richer segments of the population but unfortunately the majority of the population will choose not to access that.

Angela Records: Great. Thank you, Delia. I actually have one more question. This is a question that I have for you and it's kind of a specific question about one of your slides. So you were presenting a graph about the paper from Dr. Havelaar and there was a slide showing the causes, the various causes of food borne disease. And I'm wondering on your aflatoxin measurements do you know if that measurement of aflatoxin impact is related to just the acute disease or is there the chronic effects of aflatoxin exposure such as stunting and liver cancer and other things that could be associated if those chronic long term effects were taken into account for that column under aflatoxin.

Delia Grace: That's a very good question. And it takes us into some of the challenges too between bringing together the agriculture and public health communities. And of course as the study author is there so I will maybe – but I don't think he can actually join the conversation but perhaps he may be able to join by typing. So the study only considered – I mean basically the acute effects of aflatoxin are deaths but they are very, very rare. Many years there's no deaths at all and some years when there are deaths I think the highest has been in the low hundreds so in comparison to things like salmonella or malaria the acute public impacts are very low.

What is quite significant is the ____ carcinoma, the fact that aflatoxins especially in people who suffer from hepatitis C is causally linked, is shown to cause liver cancer. And that is the burden which you saw in the graph. What is not included is the potentially large burden due to stunting especially and immunosuppression. The challenge here is that while epidemiologically there is a strong, strong association between aflatoxins and stunting there is no proof that aflatoxins cause stunting. And for epidemiologists cause, correlation does not mean causation. So the public health epidemiologists they want to see evidence that the particular hazard actually causes the disease.

Now for development people they may prefer to think in a precautionary tense that if there is a lot of evidence, if there is a lot of association, if there's a lot of plausibility that should be enough for us to start doing something about it. We don't actually have to wait until we have actual causal proof that aflatoxins do cause stunting. So in short no, it did not include stunting because that has not yet been a proven causal effect but it is an important conversation for agriculture and public health to have, to what extent we only consider effects of a cause a problem and to what extent we also look at precautionary principle.

And the same is true for pesticides where if you actually look at the known proven mobility, mortality it is not so high in comparison to biological hazards but yet there are uncertainties. There are things we don't know about pesticides which cause, make some people very worried and that becomes then an interesting tradeoff of how we trade off known mortality and morbidity against worrying but not yet proven health issues. Thank you.

Angela Records: Great. Thank you very much. The next question is for Dr. Harvey. This is a question from Adam Caruthers and he's asking if contaminated grains are ever used to make biofuels or can they be used in biofuel production?

Jagger Harvey: Thank you.

Angela Records: Dr. Harvey?

Jagger Harvey: Yeah. So it's something again we can consider. Part of the challenge is that in the counties where we're facing this there's already not enough food to begin with. So if we're simply looking at testing on a larger scale or a max scale for when people bring it into the village mill and it's simple accept or reject it's a bit more difficult to envision taking that out of the food supply and making biofuels especially in seasons where food is scarce.

So one thing that collaborators at the University of Queensland have found is when they do analysis of single kernels out of a highly contaminate sample from our field trials it was really just one or two percent of the grains that were driving up the levels of aflatoxin in the entire batch. So by looking at things like spectral sorting so using light, certain wavelengths of light to detect these kernels where you have thousands or tens of thousands of times more of this toxin then we start to get to a solution where somebody could bring in their corn or their peanuts to a maize mill, to a mill and then sort out really just these killer kernels that are really high in levels. So that's in maize you can use that type of sorting.

In peanuts I think you can find more information on the peanuts and mycotoxin on the solution lab website where visual sorting works better than in maize to reduce these levels of toxins. But there are careful considerations about taking food out of the food chain for biofuel. Of course at the same time not feeding the populations highly contaminated food so some of the considerations there. Thanks.

Angela Records: Thanks very much Jagger. So our next question comes from George Kagote and he is noting that laws have to be addressed continuously to update based on reality and in Ethiopia for instance there are great – so this is in reference to pesticides. So there are great pesticide laws in the government offices in ____ but as you go down to the village level there seems to be a disconnect. So he's wondering if it will require empowerment at the village level for laws to be changed so that will usher in better and safer pesticide use. And so I'll pose this question to Delia.

Delia Grace: Yes, that's a great question because it's something which we hear over and over again. We have regulations. We have legislations but when we actually see what's happening especially in the wet markets, the informal markets where the poor buy and sell food we're just not seeing any enforcement. It's not just pesticides although pesticides are a real problem. In a recent study we did on aflatoxins in milks in Ethiopia found that 93 percent of milk was over the limit. There's copious limits for amounts of aflatoxin in milk.

And we have sort of approached this to say yes, we need a regulatory framework with legislation in place but it should be appropriate and sometimes – I sometimes say that when five percent of milk doesn't meet the standards you have a problem with your milk. But when 95 percent of milk doesn't meet the standards you have a problem with your standards. So I think in some developing countries the legislation framework has to be revisited so that it doesn't criminalize the majority of food in the country.

But secondly and more importantly and I think this was also in the question, we think that moving away from believing you can get food safety by command and control, by inspection and punishment, shifting to a more participatory approach whereby the appropriate standards of food safety are agreed with by stakeholders and the government and other development partners work with the stakeholders to improve their food safety and very importantly there is some change to the system so that there are incentives in place so that people get directly rewarded for producing safer foods.

And we have done models in this. I don't have time to go into them all but there have been some examples where you can change institutions so that there are better rewards for making food safety and people do want to be. So to shift away from thinking that legislation by itself will work into a more participatory bottom up approach to food safety is one of the key findings from our work in these informal markets. Thank you.

Angela Records: All right. Thanks very much. So the next question is bringing in the private sector aspect of the discussion. So this is from Sarah Augmen with the International Finance Corporation and she's asking how the private sector can be most effective since this is definitely risky business for food companies. So how would you encourage them to be more inclusive especially regarding the issues that Delia raised where small holder women led farms tends to get excluded from the more lucrative value chains. And so I'll pose this to any of the speakers who want to jump in and Delia especially since you

were mentioned in the question. But if any of you have a comment on the private sector.

Delia Grace: I would say then the private sector, we've seen in the export and here we have very good evidence over a number of years and especially in Kenya and Ethiopia have had very successful exports of horticulture and high value vegetables to European supermarkets. And what we've seen there is as I've said that the small farmers, the uneducated, the female head of households, they drop out of those supply chains unless and intentional effort is made to include them.

And if that intentional effort is made and it need not be particularly extensive, then they can be included. And in certain cases and this is an economic question, the benefits of them being included in those chains are better for everybody than if they were allowed to drop out of chains. So I think that the message there is that even as value chains becomes higher value and more discriminating women and the poorest will drop out but things can be done which will help keep them in.

Ahmed Kablan: This is Ahmed. Thank you, Delia. And to answer that I think we, without engaging the private sector and having private sector buy in into the importance for example if you look in Ghana and Ethiopia at the private sector, Nestle for example they are the one who have zero tolerance for aflatoxin. And because they want to insure high quality product and to make sure that they don't have any food borne toxins introduced in their crops.

The private sector can work with the farmers. They can start from the farm and I think if we can link and we can create more of an enabling environment for private sector to start from the field whether through contracting with farmers and insuring that they will buy the clean grain, paying them premium prices, through any other, any way that we can get private sector to work with farmers that is how they can be more responsible and more engaging and also that will insure higher returns to the investment for the farmers who will invest in interventions to insure food safety.

Angela Records: All right. Thanks both of you for your answers on that question. I think this may be our final question so we have a question from ____ and this person is from the Democratic Republic of Congo and would like to know how we as researchers and institutions in the Democratic Republic of Congo they can protect and train the population about food safety while there's a basic lack of information in terms of surveys and information on mycotoxins and food borne disease there. And so I'll direct this question to Dr. Harvey and wonder if you can address the lack of research that's been conducted there and what the researchers and institutions in country can do.

Jagger Harvey: Thank you very much and thank you for your question. That's a critical thing to think about and I did want to point out as I just mentioned in the comments that we have a set of rising experts in eastern and central Africa online with us, Margaret ____, ____, Morris Juma, these are researchers in Rwanda, in South Sudan and elsewhere who are looking at exactly what you're asking. So how do you assess what can be done on the ground in country when there's such, so little information and relatively little capacity in terms of available tests. So I would encourage you to reach out to them and ask them how they felt with this.

One of the key things when you're designing it moving forward when you're engaging the national research community and others is to look at as you do work to establish the baseline make sure that you also look at practices that from the literature are likely to be reducing the risks of these toxins because then if you can establish the evidence base for the team not just oh look, there's a big problem with these mycotoxins or with other food safety issues that you can say "There is an issue with these. There's a common practice in one region of the country, one part of this country that actually can help reduce risk of this problem" so then that can be taken up by the extension system and others considered by policy makers.

So some of the people I mentioned have also extended custom policy briefs to their ministers of agriculture teasing apart the problem, how much of a certain commodity is over the limit based on U.S. versus World Food Program versus East African standards so again the policy makers can start considering that. And then for anyone in Sub-Saharan Africa look at the hub. They have fully funded training and research placements that you can go get training there.

And also with the innovation labs where I am now look at our website, look at the post-harvest website, look at the peanut and mycotoxin innovation labs and get in contact with us because what we want to do is make sure that as their interventions and practices that can be deployed that we get those to you and get those to the people on the ground who can use those. And of course given that we're based at land grand institutions like Kansas State University if you have people in your research network who want to come for short term research or training or we want to look at researcher exchanges even back to your own institutions, that's also something that we can explore. So thank you.

Delia Grace: I'll just come in very quickly because I think it is an important point that when they're – one needs to get specific information often to engage with policy makers and to help them realize the importance. I'll just give you one example. We were recently assessing the crop value chain in Vietnam and it's important I think to come in with an overall picture to be able to tell policy makers first of all what are the food safety problems, then what are the big and important problems and then what can be done about them. So rather than just going in with one problem in mind, say, take one come in to try and find out what is the problem in a food system.

And so what happened in Vietnam was we were looking at crop value chains and with our local partners we said "Well, let's just focus on the biological hazards because we know these are going to be the important ones." And the food safety experts there didn't believe us. They said "No. We think the chemical hazards are going to be more important." And so we went back and forth and in the end we decided to look at both. And what we found was just as we had predicted. The biological hazards were creating a huge disease burden but the chemical hazards it was a negligible burden in this value chain. And the people, the experts in Vietnam, then believed our evidence because they had generated it themselves. So I think it is very important for the national experts, the national labs to be involved in generating evidence on risk and then that is evidence that will be taken seriously and used for risk management. Thank you.

Angela Records: Great. Well, thank you very much. And so this ends our session for today. I just want to thank everyone again for joining today's webinar from around the world. We

appreciate your support and your contributions. It's been an excellent discussion. Also a special thank you to our speakers, to the Bureau for Food Security and to the Agrilinks team. We look forward to seeing you at future events and online at agrilinks.org where we can continue these discussions. Thank you very much.

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