

## FOOD SAFETY REGULATIONS BASED ON REAL SCIENCE

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### **Abstract**

*Differences in regulations result in needless destruction of safe food and hamper food trade. The differences are not just the result of the history of food safety regulations, often developed in times before global cooperation, but are also built in new regulations. It may be responses to media hypes or for other reasons, but in most cases the differences cannot be justified scientifically. A major difficulty is that, due to the developments in analytical techniques the number of chemicals that are found in food is increasing rapidly and chemicals are always suspected to be a safety risk. By far most chemicals are of natural origin but could not be detected in the past because the methods available in the past were not sensitive enough. Demanding the absence of chemicals because the risk they present is unknown, however, would eventually make all food unacceptable. The general public should be shown that everything they eat is chemical, and all food components will be toxic if the amount is too high. It should also be shown that many of these chemicals will also cause illness and death if there is not enough of it as is the case with vitamins and minerals.*

**Key words:** food safety regulations, science-based, toxicity.

### **INTRODUCTION**

Differences between food safety regulations result in needless destruction of healthy food in a world where a billion people have very little or no food. Food products that meet the regulatory requirements and are therefore considered safe in one country may be confiscated across the border when exported, to protect the citizens on the other side against a health hazard. Sometimes such differences are created on purpose to block import of products for economic reasons. Because of uncertainty about whether a new product, new ingredient or a product produced using a novel processing technology will comply with the interpretation of local food laws, companies that operate internationally hesitate to invest in their introduction or development. Thus differences in regulations between countries affect on the one hand food security and on the other hand hamper international trade and innovation.

### **THE MAKING OF FOOD SAFETY REGULATIONS**

One of the main problems is the lack of understanding of toxicity by politicians, general

public, activists (antis), press and the strong influence of professional lobbyists. Populist politicians have a strong tendency to promise what makes them look good so that they will be popular, increasing the chance of re-election. Generally they do not use time to look at facts and many find scientists just troublemakers who you cannot trust.

The general public has the information from newspapers or other mass media. Journalists prefer publishing negative messages, because that is what most readers want and consequently also what the publishers want. Negative news sells. Publishing that everything is fine, food is safe and you stay alive and get old by eating what is on the shelves does not go down with the general public. Equally, TV news programmers generally care about how many viewers they get. For them correctness of information is secondary and checking information anyhow takes too much time.

Activists are just against; the topic often does not matter. In the case of food everything is wrong, by definition, because governments want to control people and industries want to make profit, all at the expense of the people. They want “the people” to believe this and be against e-numbers, preservatives, processed

food etc. “Anti” organisations often spread lies and claim to be honest. They never provide the scientific evidence of what they say. And if somebody shows evidence that they may be wrong, they claim that the research has been done for the industry or the government and everybody knows that you cannot trust industries and governments. You can trust their organisation and they will fight for you, please donate.

Then of course the industry needs regulations that allow them to maximise profit. If they leave regulations at the mercy of the public and the anti, making profit gets hard. Hence they lobby with information that they feel is right - for them. The amount of money spent by the food industry on lobbying politicians is huge. In the USA alone up to \$150 million is spent on lobbying annually (Senate Office of Public Records, 2015). That amount induced the CEO of the Irish Health Trade Association, to state that the European food industry can learn from the US industry (Ruth, 2012). He is right, but the European food industry would learn the wrong things, because lobbying is aimed at getting done what is good for the companies that hire the lobbyists, NOT for what is good for the consumers.

There are very good reasons for having food safety regulations and it is important to have capable inspectors to ensure their implementation. This is exemplified by criminal events, discussed in detail and referenced elsewhere (Lelieveld, 2012 and Motarjemi, 2014), such as the addition of lead oxide to paprika powder, diethylene glycol to wine, melamine to milk, and oil containing polychlorinated biphenyls and dioxins to animal feed. To ensure that additions to food and food products do not make the food unhealthy, there are substances of which addition to food is not allowed. If, however, the presence of traces of such substances leads to the destruction of large quantities of food, while the concentration of these substances is too low to do any harm, something is wrong. Examples are the presence of harmless concentrations of antibiotics (parts per billion) and of Sudan Red (parts per trillion) in food that lead to the destruction of food (Lelieveld, 2012). A recent (June 2014) example is the destruction of 2500 healthy calves by the

Netherlands government because it contained traces (again parts per billion) of the antibiotic Furazolidon.

The Netherlands food safety authority (Nederlandse Voedsel - en Warenautoriteit) had concluded that the meat did not present an unacceptable health risk (Nederlandse Voedsel - en Warenautoriteit, 2014).

Most man-made chemicals also occur in nature in concentrations that can be detected now, but not previously. They are produced by animals, microbes (bacteria, fungi and parasites), plants and geochemical processes (e.g. volcanoes). All microbes produce antibiotics and therefore all soil contains antibiotics (Lelieveld, 2012). More than 5000 different natural organic halogens have been identified in nature (Gribble, 2003a and Gribble, 2011). The clear and convincing evidence that chlorinated dioxins and dibenzofurans have several natural sources - both abiogenic and biogenic - is one of the most significant and politically important scientific discoveries of our age (Gribble, 2003b). Chemicals, including chlorinated organic compounds, found in food products are not necessarily additives and thus do not have been the result of criminal action. Moreover, humans and their predecessors have been exposed to the scariest chemicals for millions of years and evolution led to the development of a biological system that can cope with these chemicals.

That is why humans have kidneys, a liver and built-in filters and often have learned to use the chemicals beneficially. Even if a substance has been added illegally, if the concentration is harmless, there is neither a scientific nor a moral justification to destroy the food. Instead, the perpetrator should be prosecuted.

Requiring absence of chemicals makes that the methods of analysis determine how much is allowed and not the amount that may do harm. In the past 50-60 years, the detection limits for many chemicals have gone down by a factor of a million or more.

That means that absence now is more than a million times less than 50 years ago. Not because of scientific evidence of toxicity, but because of the improvement in the methods of analysis.

## SCIENCE BASED REGULATIONS

We need regulations but they need to be sensible, protecting consumers from harm. Destroying safe food does not protect anybody. This requires accepting that toxicity is a matter of a substance (chemical) in combination with a dose, as posed by Paracelsus 500 years ago (“Poison is in everything, and no thing is without poison. The dosage makes it either a poison or a remedy”). Although the remedy part may not apply to all substances, it certainly applies to many. Since Paracelsus, a vast amount of evidence has been produced (Ames and Gold, 1997). Clear examples showing the importance of the dose are vitamins and minerals. Both too much and not enough may kill you. All food contains natural substances that will be poisonous (toxic) if ingested in too high amounts. Cabbage, broccoli, Brussels sprouts, cauliflower, turnip, radish, horseradish, mustard and rapeseed all contain glucosinolates; rhubarb, spinach, parsley, chives, purslane, cassava, amaranth, chard, taro leaves, radish, kale and monstera fruit all contain oxalates; peanut, soy, spinach, broccoli, potato and apple contain saponins; potatoes, tomatoes and aubergines contain solanine; cinnamon, peppermint, green tea, chicory and blueberries contain coumarin; pulses contain lectins; cassava contains linamarin etc. Nevertheless, these produces are safe to eat in moderate or often even fairly large quantities without risking poisoning. Following the understanding of the general public, however, one would have to stop eating, because the food would be toxic.

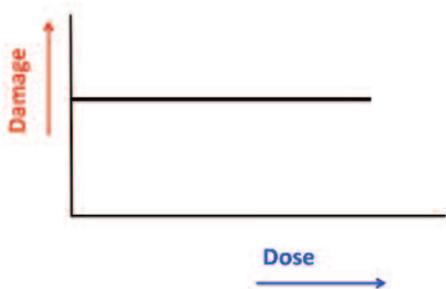


Figure 1. Interpretation of toxicity by the general public: a toxic substance does damage independent of the dose

Figure 1 shows what most people think about toxic substances, namely damage can be prevented only by total absence. This is what in

public debates is demanded from governments if somebody has raised public interest (usually the “antis”) that a product is toxic, because they found out that a product is contaminated with a certain chemical. This leads to absurd regulations, as those that lead to the destruction of safe and nutritious food. Also some chemicals are no longer allowed for use in packaging materials or process equipment even when the concentration resulting from leaching into the food is so low (sometimes below the natural concentration in the food), that harm is not possible and indeed never has been reported.

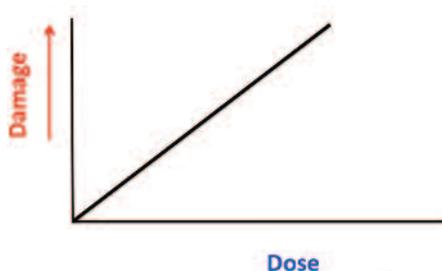


Figure 2. Toxicity as understood by most politicians and policy makers

Figure 2 shows what most politicians and policy makers believe, viz. the higher the concentration in a product, the more damage to health, but a very low concentration where e.g. only one person in a million will suffer is usually considered acceptable. Still the idea is that there is always damage and no damage will require total absence. In many countries those in the departments or ministries who have to draft the text of the laws have to follow the instructions of the politicians, because the parliaments have to approve the proposed laws. This again may lead to absurd regulations.

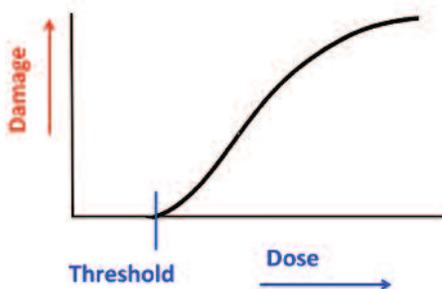


Figure 3. Most toxicologists agree that there is a threshold below which there is no adverse health effect

Toxicologists know that below a certain dose there is no effect (the no adverse effect level, NOAEL) and hence at that level no reason for

concern (Figure 3). This is the level that does not overload the capabilities of the human body to protect itself (the functions of e.g., the liver and kidneys).

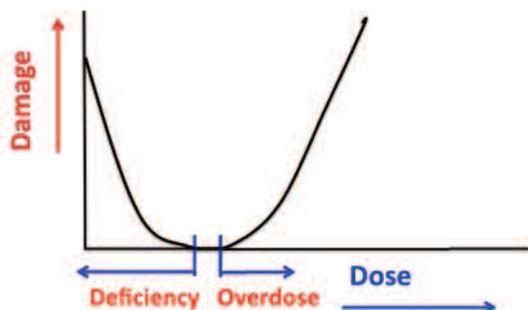


Figure 4. Many substances are harmful in both too low and too high amounts

Paracelsus described 500 years ago that if the dose is too high a substance will be a poison, but a low dose will be a cure. This certainly is the case with vitamins and many minerals (Figure 4), where deficiency will damage health but so will be an overdose.

The Global Harmonization Initiative (GHI) intends to find ways to make the general public and politicians to understand these matters, diverting the tendency to precautionally making food safety laws that do not protect the public but rather make them suffer. GHI would like to see all food scientists to help spreading this knowledge and it is hoped that the information in this articles will help doing so.

## CONCLUSIONS

Too many food regulations are not based on science but on misinformation and misinterpretation. These regulations lead to the needless destruction of safe food. Differences in food safety regulations cannot be justified scientifically. The general public should be shown that everything they eat is chemical, because nature consists of chemicals. Then they

should be made aware that all chemicals and hence all food components will be toxic in too high a dose. They need also be shown that many of these chemicals will also cause illness and death if there is not enough of it. Good examples are vitamins and minerals. It is hoped that the examples and graphs provided in this article will help food scientists everywhere to convince public and politicians every time an issue comes up that could lead to absurd regulations.

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