

**FOOD SAFETY EXPERTS** 

# Become a Recognized Food Safety Expert!

**Tools and Tips to Address the  
7 Most Common Food Safety Issues**



**Rob Kooijmans  
& Kitty Appels**

# Tools and Tips to Address the 7 Most Common Food Safety Issues

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## Introduction

Do you recognize one or more of the following scenarios? Are you struggling to convince senior management or your company owner to invest sufficient time, money and resources in quality and food safety? Do you have a feeling that quality and food safety are not taken seriously enough and are just there for reasons of compliance? Do you struggle to motivate the shop floor workers and their line managers to live and breathe quality and food safety behaviour at all times? These are clearly the most pressing underlying issues when it comes to being successful and generating results that matter as a Quality or Food Safety Manager or professional.

Needless to say that this usually comes with certain consequences. First of all you and your company might be facing a good amount of blocked product which is not conforming to your product specifications or just plainly not at all food safe. This will result in additional costs for investigation and rework. In the worst case this will even result in scrapping of the finished goods or intermediates. The next level up are the issues which are generated as a result of this with your customers. This might give rise to a (too) high complaint level and you find yourself in a situation continuously performing root cause investigations and writing letters to your customers. This way customer audits are not a nice time for you! The ultimate consequence of course is a product recall, which is just a matter of time. When not all aspects of quality and food safety are in control on a daily

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basis it is just a matter of time before something serious happens and the end result is a product recall with all the costs involved.

The above are exactly the reasons why you should read this e-book! In this e-book we will give you good knowledge about quality and food safety management, alongside with lean tools that have really been proven to work. Next to this we will give you tips which are easy to implement in your company. Although it is just a small beginning, some of these tips might already help you. It is up to you to start the implementation as soon as possible! Enjoy reading our e-book.

Kitty Appels & Rob Kooijmans



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## **About us**

We are Kitty Appels and Rob Kooijmans, founders and owners of Food Safety Experts, Food Safety University and FoodRecall.nl. Together we have more than 40 years of experience in the international food industry and have worked for and with all the large players in the food industry. We also have a wide experience in working with a vast amount of SME's in all areas of the food industry. Our experience includes fruit & vegetables, nuts & spices, meat, fish, dairy, beverages, baking, bio-technology, infant nutrition, pharmaceuticals and ready to eat.

We believe that everybody should be able to enjoy safe food at all times. We believe that by sharing our knowledge and tools with QA and Food Safety professionals across the globe, together we will make a difference towards improving food safety for everyone. Our vision is a world where safe food is a given for everyone. Our mission is to enable QA and Food Safety professionals to make a difference towards improving food safety. We do this by actively sharing our knowledge and tools and by creating a global community.

Kitty has studied Food Technology at the Van Hall Institute in Bolsward, The Netherlands. From there on she worked for Friesland Domo in Japan, was Technical Sales Manager for Ecolab in The Netherlands, QA manager for Tauw Group, she performed a lot of due diligence investigations and had several interim positions while working for Tauw

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International and as entrepreneur. Kitty has worked for renowned companies like Heineken, Silliker, Sealed Air and Friesland Campina and has audited many more companies on a global level during her career as part of her due diligence work.

Rob graduated in Process Control Technology at the Eindhoven University of Technology in the Netherlands. He started his career at Unilever, where he held several positions Quality and Food Safety for both the Home & Personal Care business as the Food business of Unilever, both in operations and in R&D globally. Rob continued his career as QA & Innovation Director for Farm Frites and as QA Director for DSM Food Specialties. Next to this Rob has worked for companies like TNO, Diversey Consulting, BT and PWC. Rob has been involved in several mergers and acquisitions and has a very international experience, having done business in 52 countries. Rob has also audited a wide range of companies around the globe in the food industry over the past 20 years.

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### Listeria Monocytogenes

When you think about Listeria Monocytogenes which word pops up in your mind? Do you recognize the word 'Difficult' when you think about Listeria Monocytogenes? Of course it is one of the most wide-spread bacteria that give rise to food safety issues. Often companies experience many re-occurring issues once they find themselves involved in issues with Listeria Monocytogenes. For you as the responsible person for food safety it is all too often very difficult to pinpoint where it is coming from, where it is hiding in your factory. It is needless to say that solving the issue for your company is paramount in your job and of utmost importance for the company you work for.



Photo: Listeria Monocytogenes

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Recalls are the most nasty outcome of an issue with Listeria Monocytogenes. These happen on a regular basis throughout the entire food industry. Too often companies find it difficult to determine the root cause and hence area facing a continuous and increasing risk level of finding Listeria Monocytogenes in their finished products. Do you know how to make a good root cause analysis?

The reason for this is the fact that once Listeria Monocytogenes has found a nice place to hide, it usually starts multiplying and in the end does end up in food stuff, resulting at least in product going to waste and a lot of costs for the company. But as said before, the highest price to pay will be a product recall – even resulting in a bankruptcy of the company in some cases.

Most important for you is to prevent Listeria Monocytogenes in your factory. How can you best achieve this? Water is the most determining factor in the success of defeating Listeria Monocytogenes. It is generally known that Listeria Monocytogenes is omnipresent in the environment – it literally sits on the soles of your shoes. This is one of the mechanisms for Listeria Monocytogenes to enter your food factories. Usually by wet cleaning of the floors (more often even just wet floors) Listeria Monocytogenes accumulates in drains. **Removing Listeria Monocytogenes from drains is easily done by inserting a chlorine tab in each drain on a weekly basis.** Of course preventing water on floors and more importantly even on equipment is paramount in Listeria

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Monocytogenes prevention. When water must be used, make sure to install gutters and pipes to guide the water in a good fashion toward drains. The result should be dry floors at all times as this will take away the biggest risk of proliferating Listeria Monocytogenes. The second largest of Listeria Monocytogenes sources are coolers, freezers and air conditioning units as these involve water (moisture) as well. Listeria Monocytogenes has a tendency to site between the cooling ribs of such systems. You need to apply special cleaning chemicals such to be able to remove Listeria Monocytogenes effectively from these areas (see <http://ecolab.com> or <http://diverse.com> for more info) and clean these units on a regular basis. Also, make sure that all condensate is guided properly to a drain by using gutters and pipes to ensure no condensate falls onto open product.

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### Allergen Management

Real knowledge about allergen management is very often the first factor which lacking with QA or Food Safety professionals. There are various systems (e.g. LEDA and VITAL 2.0) in use, and the legal framework differs between the geographical regions when it comes to the list of (mandatory) allergens to be declared. Managing the daily practices is even more difficult: how do you exactly prevent cross-contamination, what are the best ways to manage allergens effectively? One thing we know for sure: one of the main sources of undeclared allergens in food products are issues with allergens in the raw materials being used. Do you have sufficient insight in your supplier's processes to establish the real risk of potentially undeclared allergens in your raw materials? It's all these above issues that make allergen management to a difficult area for a lot of QA managers throughout the world in all types of food industry,

Waste is the lowest level of impact that undeclared allergens or cross-contamination have for most food producers. If the undeclared allergens end up in finished goods at your customer's company, this will represent a serious issue which needs to be handled differently and with care, otherwise it might result in a full-blown product recall. Did you know there are a lot of changes in legislation? Do you know what recently changed?

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### Food Allergen Icons



Photo: Symbols used for food allergens

With recent changes in international legislation (e.g. in the USA, Canada and China) it is nowadays a criminal offence to produce and sell unsafe products into the food chain. This of course includes undeclared allergens. So the effect of issues in allergen management might be you going to jail. In the USA there are already several examples of people being put to prison for food safety issues that caused people to die. Sentences up to 25 years are no exception for those involved that did neglect to properly manage the risks towards food safety in their day-to-day running of their business.

Raw materials are always the starting point for a good allergen management approach. First of all you need to know what the risks are involved in the raw materials you use. A good starting point is the website of the INFORMALL project, run from the University of Manchester:  
<http://research.bmh.manchester.ac.uk/informall/allergenic->

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foods/. This way you can make sure you factor in the right risks when it comes to raw materials. When handling goods, aspects of segregation are important factors to manage allergens: physical segregation of good during the production process, but also the use of separate utensils (e.g. separate scoops to dose minor materials) and sometimes even separate production lines for allergen-free products are required. A good way of supporting the principle of segregation is to use **colour coding for utensils, production lines and even for storage areas of products of different allergen classes**. Finally, if you still are confronted with issues in allergen management, the best resource to tap into is the Food Allergen Research & Resource Program (FARRP) of the University of Nebraska: <http://farrp.unl.edu/>. This group has all the expert knowledge you might need and can also perform independent (and confidential) ELISA testing for the presence of allergens in food stuff. This might be a valuable resource for you in the case you need to manage a potential (recall) issue involving allergens.

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Photo: Allergens chocolate, eggs, peanuts and shrimps

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### **Foreign objects**

An untidy work situation is in most cases the primary cause of foreign objects in food products. Do you recognize the following: plant maintenance leaving about nuts, bolts and even complaint utensils after having done their job in the plant? Is your plant always fully “5S” (see <https://www.kaizen.com/knowledge-center/what-is-5s.html>), or are there still a lot of unused materials present in the production environment? Most of the time this is the case in food factories. Do you get a lot of complaints on foreign objects from your customers and do you struggle sometimes to really pinpoint the root cause of these foreign objects? In most companies foreign objects are taken for granted, but this should not be the case for you!

Foreign objects when detected internally (in product you have not sold yet) will often lead to rework (and all related additional costs). Quite a few food products can be sieved and re-processed to get rid of any potential foreign objects present in the product. Of course there is additional time and money involved in the process. More and more customers will get increasingly annoyed if they receive repeatedly issues with foreign objects. So you will find that complaints will easily result in more severe (commercial) issues with your customers. Foreign objects are often the root cause of product recalls, especially if the foreign objects are sharp (and can cause injuries in peoples’ mouth of intestines) or if the foreign objects represent a choking hazard(for reference see

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this webpage of the FDA:

<http://www.fda.gov/ICECI/ComplianceManuals/CompliancePolicyGuidanceManual/ucm074554.htm> ).

Next to this a lot of your customers might still recall their products, even if you can prove that the foreign objects are in the “safe” ranges in terms of size and not being sharp. This is usually done for reasons of brand protection. A good tool to physically check the choking hazard for infants can be found on the website of Product Safety Australia:

<http://www.productsafety.gov.au/system/files/ACCC%20Choke%20Check%E2%80%93DIY%20safety%20tool.pdf> .

As stated before, the best way to prevent foreign objects is to work in a clean environment, where everything has its own place. One of the most efficient ways to achieve this is to implement the 5S principles of lean manufacturing / TPM (see reference above). The following important principle is to **use primary colours for all utensils / replaceable machine parts / rubber seals / etc.** in your factory and even consider to have a different colour throughout the different departments in your factory. This way self-introduced foreign objects are easier to be traced down to one of the departments in your factory. Another often used preventive method is the **use of sieves**. This can be done effectively for powders and liquids. A good sieve is made of steel and always placed in combination with a metal detector (to detect a broken sieve). If the product has some metal in it by nature (e.g. cocoa powder) you typically insert rare earth magnets in front of the sieves to get the small metal particles out of the product stream.

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Next to this it is also important to keep processing lines when handling open product fully closed or covered as much as possible as this will prevent dusts and insects to fall into your product. As behaviour is also an important factor you might want to focus on this as well – **a good method for this is to get a transparent jar in the staff canteen or near the production entrance where you collect on a weekly basis all the foreign objects you (and others) have found in the factory.** You can even make a nice trend chart showing in which department how many foreign objects were found on a weekly basis. This way you increase staff and management awareness on foreign objects.



Photo: Sieve, courtesy Russell Finex.

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### Cleaning liquids

Manual cleaning is often the source of cleaning liquids and disinfectants being present in food products. Also not well designed CIP systems or errors in CIP systems often give rise to the same problem. The results are usually off-taste and off-flavours in your finished products, but the consequences can be far more serious! Do you have enough insight in the manual cleaning practices in your factory? Do you have enough insight in the CIP cleaning performance as well? Are you primarily focussing on the visual cleanliness of the equipment or do you evaluate the microbiological cleanliness as well? Next to making sure equipment is microbiologically clean it also needs to be free of remains of cleaning and disinfection agents as well.

Product which has had an interaction with cleaning or disinfection chemicals will most of the time go to waste as reworking or reprocessing is not possible. Most of the cleaning chemicals are toxic or even carcinogenic to humans and hence must be prevented from entering the food chain. In case of off-taste, off-smell or off-colour complaints do you always consider potential contamination with cleaning or disinfection chemicals as a potential root cause? More severe spills of heavy duty cleaning or disinfection chemicals might even cause personal injury of people who are eating or drinking the food products, giving you a lot of people that suffer from burns to the mouth or intestines as a result. Of

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course mild to severe contamination levels will clearly result in a food recall.

For manual cleaning the most important factor is to make sure the **final step is rinsing with clean, potable water to get rid of any cleaning or disinfectant chemicals**. Some companies use alcohol as a sanitizer, which will evaporate of course. But you must make sure you leave sufficient time for the alcohol evaporate before using the equipment in your production process. For automatic cleaning systems (CIP), the verification of absence of cleaning or disinfection chemicals in the final rinse water is usually done by using the combination of inline pH and conductivity measurements. Of course the rinse water can be used only once and it must be clean, potable water to start with. CIP system configuration is a specialist job, best done by the experts of you cleaning and disinfection chemical supplier (see <http://ecolab.com> or <http://diversey.com> for more info). Finally one aspect to take care of as well is to ensure that there is nowhere standing water in your production line as this will be a potential hold-up location for cleaning and disinfection chemicals. Hence make sure that the drainage point of your production line is always located at the lowest point and next to this you should make sure that all residual water flows to that lowest point. So in practice you will find yourself in a situation where you will have multiple drainage points in your production line to ensure all rinse water can be properly drained at the end of the cleaning cycle.

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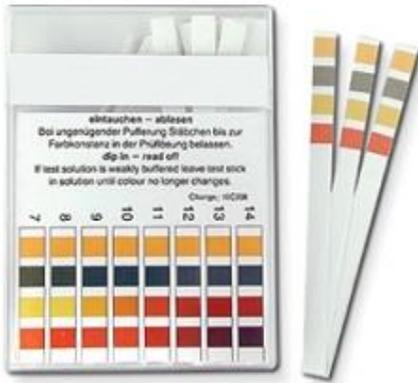


Photo: pH test strips, courtesy Amazon.com

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### **Food Fraud**

Are you struggling with defining the requirements of Food Fraud? When it comes to Food Fraud there are two main categories you need to consider: intentional adulteration and economically motivated adulteration. Intentional adulteration is defined as individuals that intentionally adulterate your products (e.g. insert poison, viruses or bacteria in your products or find another way to change the properties of your product and make it potentially harmful for others). Economically motivated adulteration happens when individuals or companies have an economical incentive to adulterate products, e.g. when prices rise or fall sharply in a short period of time. Another time to be suspicious of economically motivated adulteration is when buying, handling or selling expensive or exclusive products (e.g. Manuka honey).



Photo: Manuka honey

Food fraud comes in wide range of varieties and is often quite difficult to detect. When food fraud is detected while the

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product is still inside the company the product must be blocked and most likely will be scrapped. When the product is already in the market, the issue will quite easily escalate to a recall situation. **The USA, Canada and China have put new legislation into place since 2016, which mandates the authorities to blacklist any company from exporting goods to these countries if there is a suspicion of food fraud.** The same legislation requires you to take appropriate action and perform a risk assessment in your business to investigate whether or not you are prone to food fraud (see <http://www.fda.gov/Food/GuidanceRegulation/FSMA/> and <http://eng.sfda.gov.cn/WS03/CL0768/98109.html> ) .

Good prevention starts with profound insight and the best place to start here is the FDA website. The FDA has developed a checklist which can be used for food defence and next to this the **FDA** has developed a comprehensive **risk assessment tool** (see <http://www.fda.gov/food/fooddefense/toolseducationalmaterials/ucm349888.htm> ). Alternatively you can have a look at the **SSAFE toolset**, which has been developed by PWC in collaboration with large players in the food industry (see <http://www.ssafe-food.org> ) . Still the basics need to be in place such as temper evidence – not only on your finished goods, but more and more also for your raw materials and intermediates. Best in class is to use your own logo included in the temper evidence solution (e.g. have a cap for piles which has your logo on it – of course this requires an additional investment for your cap supplier to make new

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inserts for the injection moulds to make this happen). Another strong tool is to **continuously scan for changes** in pricing of your raw materials and finished goods, as these might give rise to economically motivated adulteration. If prices shown big changes either up or down it is wise to perform additional tests on your raw materials in terms of composition or activity / dilution levels. Finally you want to make sure to limit options for intentional adulteration by keeping open product behind closed (and preferably locked) doors. This involves things like access control (only allowing designated staff to handle open product), locking inlets and manholes of all tanks (protecting your raw materials / intermediates and finished good stored in tanks). Another useful item is to hand our staff batches with photos on it and make them wear visibly, this way you make sure only your employees and allowed visitors / contractors are present in your factory.



Photo: Food fraud with apples

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### Radiological hazards

Do you know when you need to include Radiological hazards in your risk analysis? With the implementation of the Food Safety Modernization Act (FSMA) in the USA, a lot of food producers, also internationally, have to assess the risks they face of radiological hazards as part of their HACCP approach. Do you know how to start with this? Of course raw materials might be treated with irradiation to get rid of microbiological issues – this is coming in some markets and totally forbidden in others. Did you ever think of potable water as the source of getting radiation into your products? Some areas will have a high natural presence of radioactive minerals, which might end up as **radioactive isotopes in your potable water system**. Other factories might be built on sandy grounds which sometimes contain very high levels of **cadmium** or other potentially radioactive compounds. If your company uses crops or products derived from crops, you need to be aware that radioactive compounds might accumulate in these as well. On the other hand some radiological hazards are easily detected because they involve high levels of radiation and most of the time are related to nuclear disasters (e.g. Chernobyl and Fukushima).

The hazard involved in radiologically contaminated products is of course that these products are potentially carcinogenic (can create cancer) or even mutagenic (can create cell mutations), but quite often these negative health effects only occur in the longer term and are therefore difficult to

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pinpoint to the ingestion of one specific food stuff. The same is (perhaps even more) true for processors who are potentially in daily contact with radiologically contaminated food, as their level of exposure might be even higher than from those who consume the food in normal quantities as part of their daily diet. So far only a few radiological issues resulted in a food recall, the vast majority of these was linked to the earlier mentioned nuclear disasters.



Photo: Radiology Baby food

A good starting point to look for radiological hazards is to start with **getting information or analysing your potable water source** (well or municipal) on a regular basis. Next to this asking information from the authorities on the **composition of the soil around your plant** and / or the **fields** you use to grow crops is also a wise thing to do. In some countries irradiation of food stuff is allowed and hence it is common practice to ask your suppliers to a **clear statement** whether or not they do irradiate the products you buy from them. By the same token you want to have a statement from

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them as well declaring that they ask the same question to their suppliers and so on. This shows it is becoming increasingly important for you to know what step your suppliers are at in relation to the entire food chain. **You need to really start thinking from farm to fork!**

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### Labelling

Did you know that Labelling is the single biggest root cause for product recalls in the food industry? Labelling mistakes are the single biggest reason for recalls in food products which are caused by companies themselves (50% of the issues is still originated externally and cause mainly by raw material suppliers). Do you struggle with content management of your product labels? Is it difficult to grasp all the regulatory and legal details your labels have to comply with? Are you sure your labels reflect your ingredients and nutritional information correctly? Managing the content of your labels manually is becoming more and more impossible! Quite often you might find yourself in a situation where the wrong label has been applied onto a product, or the label contains wrong information for allergens, weight, nutritional values or has errors in the ingredient declaration. The authorities required more and more information to be present on the labels, which gives rise to less and less combination of labels for multiple countries thus give you more labels to manage (and more room for mistakes).

Labelling mistakes very often do lead to **product recalls**, especially when **allergens, weight / volume information and ingredient declaration** are misrepresented. This might in term lead to claims of customers and supermarkets because of a loss of sale next to the product replacement costs (because quite often the product will go out of stock and it will take several weeks to fill the complete supply chain

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again). If you have specific health claims on your product label, you might need to be even more vigilant. In many countries (e.g. European Union) there is **strict legislation** on what type of health- and other benefits you can communicate on your label and very often you need to be able to have **scientific substantiation and even pre-approval of the authorities**. Again, this is very often a reason for a product recall, instigated by the authorities.



Photo: Label magnifying glass

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The best solution to prevent misrepresentation of information on product labels is to use specific software to automatically calculate the information, based on raw material information and of course the recipe of your finished product. Naturally, all information to start with (raw material information and your recipe) needs to be correct in the first place – so this is the place where you really want to build in extra checks (e.g. four eye principle by one person entering the data and another person checking the data). As applying the wrong label is also a big root cause of labelling issues, you want to look into label handling in some more detail. Do you have a colour / bar coding system of your labels when stored, and you have only one set of labels present at the production line when producing? **Best practices involve barcode scanning of each label just before or after it has been applied on the product** – connecting the barcode scanner to your MES system to look for the right code. If you do not have an MES system, you might want to apply the four-eye principle on the first label you want to apply and “learn” that label into your barcode scanner manually. Another good thing to implement is to have your QA/QC department physically check the first product coming of the production line for labelling mistakes, before continuing full production. It is better to spend five minutes up front rather than to waste product in the end.

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## **Summary**

In this e-book we have given you several good tools and tips to address seven of the most common issues in food safety management. Below you will find a brief summary of each of the subjects.

### **Listeria Monocytogenes**

Once you have Listeria Monocytogenes in your factory it is difficult to get rid of it. The most important factor to address this is to keep dry floors and make sure water where used is guided to drains in a fast and efficient manner. Listeria Monocytogenes has a tendency to accumulated in drains and from there proliferate itself onto and into equipment. Next to keeping drains sanitary by inserting a chlorine tablet on a weekly basis, you also want to make sure no water is present on and near your production lines.

### **Allergen management**

For allergen management two key areas are important. First of all you need to make sure you really understand the potential presence of allergens in your raw materials, especially for process raw materials it is important to have detailed insight in the production process. Together with your product formulation this will determine the allergens in your finished products. Secondly you also want to make sure you segregate allergens as much as possible. Once good way of doing this next to physical segregation is that have dedicated equipment and tools to handle allergens an even to colour

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code these so that you uses visual management techniques do differentiate allergens from each other and from allergen free products and raw materials to prevent cross contamination.

### **Foreign objects**

Foreign objects start with your raw materials - you need to understand what foreign objects can be naturally present e.g. in crop and also what foreign object prevention your supplier of processed ingredients have in place. Next you want to make sure all raw materials you use are sieved as much as possible. If possible you also want to sieve your finished product and potentially use rare earth magnets to trap metal pieces. Of course you will use a metal detector or even better X-ray at the end. Furthermore your factory environment is a key source of foreign objects and hence it is important to keep it as clean as possible. You can best to this by implementing the 5S technique in combination with a daily / weekly inspection round to find foreign objects and display these in a central location. You can even add a list per department to it to create a sound competition!

### **Cleaning liquids**

Remains of cleaning liquids are a potential cause for recalls as most of the chemicals in use to clean are not food grade. The most important aspect to manage here are automated cleaning systems (CIP). You really want to make sure to automatically monitor the cleanliness of your rinse water by evaluating the pH and conductivity. Next to this ensure you

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check all the draining locations are really at the lowest point in the production line, otherwise you might have remaining CIP liquids in your production line. Next to this in manual cleaning you want to make sure all equipment is properly rinsed before use. You can use test strips for this purpose (pH).

### **Food Fraud**

Food Fraud is an upcoming theme, especially with changes in (international) legislation (e.g. FSMA in the USA and the new Chinese Food Law). You need to be aware of economically motivated adulteration and intentional adulteration. The best way to look for economically motivated adulteration are times when the price of ingredients or finished products sharply rises or drops. This is the time when you want to perform additional checks. For intentional adulteration access control is key. You want to limit access to your site (and close to your product). This is best done by having people wear badges and preferably to use this of electronic access control.

### **Radiological hazards**

Radiological hazards are perhaps the least known hazard type. This will change quickly as with the introduction of FSMA in the USA food producers now have to evaluate radiological hazards as part of their HACCP approach. One of the main areas to look into is your environment in terms of soil (in case of use of crops) and your water source. The second big area to be aware of are your raw materials and their country of origin. You do not want to buy raw materials

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from a nuclear compromised area like Chernobyl or Fukushima within further testing.

### **Labelling**

Labelling is the single biggest root cause for product recalls. It is really important to manage the content of your labels as mistakes in allergens, ingredients, weight, volume and best before dates give rise to product recalls. Best is to manage the content of your labels with an automated system (or automate it yourself as much as possible in Excel). Secondly you want to ensure you apply the right label on the right product. This is best done by using barcode scanners either connected to your MES system or a barcode scanner with a “learn” button which you can reset at the start of each production run to test for the correct label – please make sure you use a 4-eyes principle here to not check for the wrong label!

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Do you want to have more useful and easy to implement tools and knowledge?

Do you want to stop searching the internet for hours in order to find only half-useful information?

You don't want to participate in course that take a lot of your time (an money) and only give your academic information which is difficult to apply in real life?

**YES? Then this is your chance!!**

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