Free digital newsletter to support your food safety management journey

LGC ASSURE

Insights

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An issue of allergen management

Welcome to the second edition of *LGC Assure* Insights, a free digital newsletter to support your food safety management journey. If you didn't manage to catch the first edition that gave a deep dive into *Listeria monocytogenes*, then click here

In this edition I want to focus on allergens and allergen management examining trends in recalls around the globe, root causes and some tips and tools to manage allergens more effectively. But before I do here's an overview of some interesting current affairs including a few issues and incidents happening across the world.

Covid 19 had a devastating effect on human health but one positive aspect has been the significant reduction in foodborne disease as a result of a number of factors including improved hygiene and less eating out although reduced reporting and investigation will also have impacted the cases especially in the early days of the pandemic. Australia reported a 27% reduction in salmonellosis whilst in England outbreaks of gastrointestinal illness were 52% lower and the USA had 26% less infections from foodborne pathogens. If you are interested in understanding the burden of foodborne disease the World Health Organization (WHO) has a very useful guide.

Supply chain shortages due to the war in Ukraine have prompted widespread replacement of key ingredients such as sunflower oil and the global disruption of supply chains has significant potential to increase fraud. A recent recall of a counterfeit chocolate bar reminds us to be vigilant and understanding the risk of food fraud and undertaking vulnerability assessments are key to reducing business risk. Salmonella featured heavily in recent food recalls including chocolate, pistachio halwa, cantaloupe melon, infant formula, bakery goods and pet food. Norovirus contamination of oysters led to several food recalls in Canada (1, 2, 3) whilst *Listeria* contamination resulted in recalls of halloumi cheese, cooked sliced meat and jerky. Glass and metal contamination resulted in recalls of pickles and peanut butter, respectively and potentially unsafe levels of vitamins and minerals in a ready meal led to a recall. However, the largest number of public recalls continued to be due to misdeclaration of allergens on pack; egg in noodles, milk in cookies, mushroom jerky, and a ready meal, sulphites in dried strawberries and plums, nuts in chocolate bars, gluten in rice noodles and powdered drinks and multiple allergens in cheese crackers and paella.

LGC Assure Insights is different from other news sources as it combines otherwise unpublished food safety management data held across the *LGC Assure* Network of companies with real-time events to provide an unparalleled view of current and emerging issues and trends. And, of course, it is free.

Even kings get allergies

So this leads me to the main feature of this edition which is a focus on allergens. Although it is often reported that food allergy is a modern phenomenon, Hippocrates (460 - 377 BC) is widely attributed to have first recognised this and there is also evidence that Chinese Emperors as early as 2735 BC were advising the public on foods to avoid due to allergy. Despite some detractors, King Richard III (1478 - 1535) is reportedly the first recorded individual with allergy to strawberry although it wasn't until the early 1900's when the first scratch test to diagnose allergy was developed by Schloss that food allergy began to emerge as a science.

Food allergy and potentially fatal anaphylaxis have increased in the last four decades due to increased awareness, diagnosis and what appears to be a sustained underlying occurrence. The science behind food allergy is fascinating and there are plenty of information sources for those inquisitive about the biological mechanisms underpinning it. Leading authorities on food allergy such as the Food Allergy Research and Resource Program (FARRP) and regulators (USA, UK, Australia-New Zealand) also provide useful overviews to food allergy and associated controls.

Virtually any food can be the cause of allergy but regulators across the world have generally focused on a restricted number of key allergens, often based on prevalence in country or regional populations. As a consequence, although there are a certain group of allergens that tend to be reflected in most legislation (peanut, nuts, egg, milk, cereals with gluten, fish, shellfish, sulphites, soy) there are several allergens that feature more regionally (lupin, sesame, celery, mustard, tomato, etc). Codex guidance and country specific legislation mandating the labelling of foods with information regarding allergens has only been in place for the last 20 years (USA, EU, Australia-New Zealand).

At the root of it

In line with the introduction of allergen labelling regulations, global allergen recalls have increased dramatically in the last few decades although this is more of a reflection of the precautionary recall of products due to non-declaration of allergens rather than due to allergic reactions in individuals with allergy. Indeed this type of precautionary public recall is something to be welcomed as part of incident management programmes that should be in place at any food business operator. Allergens that are most frequently cited as reasons for global recalls include milk, gluten and tree nuts with the main food culprits being baked goods, ready meals and confectionary. Notwithstanding the fact that food businesses should have preventative measures in place to reduce the chance of a food allergen incident, it is essential that if an incident does occur the root cause is identified so that remedial measures can be put in place to mitigate any recurrence. This is probably the most important but often the least adopted measure as managing the immediacy of the incident is generally viewed as the key component in incident management. Root cause analysis is now an integral part of some GFSI-recognised food safety management certification schemes such as the BRCGS Global Standard Food Safety and associated training is also essential to ensure capability in this important discipline.

Allergen thresholds is one of the most contentious subjects in this field as knowing levels likely to elicit an adverse reaction in a susceptible individual is essential in determining the significance of levels in foods and consequently the sufficiency of controls in a factory or food service environment to prevent their presence in such products. This is also helpful in managing the unnecessary declaration of precautionary allergen labelling of foods with 'may contain...' or 'made in a factory handling...' and advice on thresholds and associated risk management in relation to labelling is provided in the Voluntary Incidental Trace Allergen Labelling (VITAL) platform.

Structured allergen management in a food business is essential to ensure that allergens which are not intended to be present in the food are prevented from contaminating the product through raw material, equipment, environment and people control. Aligned to this, the labelling of foods where intentional allergens are present must be applied rigorously and where mitigations are insufficient to reduce the risk of cross contamination with other allergens this should be declared on pack.

Legislation can vary significantly across the world and whilst this is most aligned for prepackaged foods, the risk associated with eating out in restaurants and foods prepared on a retail premise and packaged on site have only recently been subject to stricter information requirements. Verification is a key component of assurance of allergen controls and like any analytical technique it is essential that the laboratory undertaking

the test is suitably accredited and that the test method is appropriate for the allergen and also the food matrix being tested. For example, testing for the allergen referred to as 'milk' can utilise technology to detect beta lactoglobulin, casein, lactose or indeed bovine DNA – each has its merits but can also give false assurances if used in the wrong circumstances – always seek the right expertise when testing and interpreting results and make sure the laboratory is conducting routine proficiency testing with reliable materials.

A product sector that has grown significantly in recent years is 'allergen-free' foods including gluten-free, milk-free, egg-free, nut-free and many more. With the exception of gluten-free that has a defined legislative standard of <20mg/kg gluten, all other free-from claims are essentially absolute and therefore the food must not contain any detectable amount of the allergen in order to comply with country labelling laws. This requires a degree of factory control beyond that for general management of allergens with extensive risk assessment of ingredient supply through to factory management and finished product testing and guidance and certification standards have been developed to support food business operators.

So there you are, a brief history of allergens and allergen management that I hope provides some useful insight and advice on the issue and more importantly the controls to manage them effectively. I will leave you with a few further links to some fantastic resources available regarding food allergy and even an online training module to test your skills and knowledge.

In the next edition we will be looking at the rather significant challenge of sustainability and so watch out for that arriving in your inboxes soon.

Alec Kyriakides
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independent food safety consultant

Allergens in figures - March 2022

483 Notifications on allergens in March
424 notifications in food only
25 total allergen notifications
(RASFF data taken from Safefood 360 Risk)

Looking at the data

Many sites have procedures and processes in place to address allergen issues that arise and recalls are only caused when one of these systems fails.

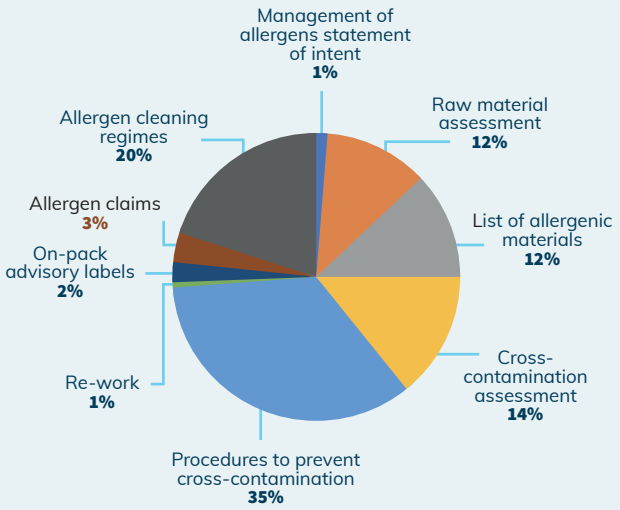
The root causes of allergen incidents are often associated with one of the following:

- A failure in the allergen management system.
- A failure in the label creation process, resulting in wrong or incomplete information on the label.
- An error during the packing processes at the food site, resulting in the wrong product being put in the wrong packaging.

The following graphs analyse data from two sections of the BRCGS Global Standard Food Safety - allergen management (5.3) and packing and labelling control (6.2). The percentage figures are based on the total non-conformities for the section only and then for clauses within that section. They do not represent a percentage of the total non-conformities for the entire Standard.

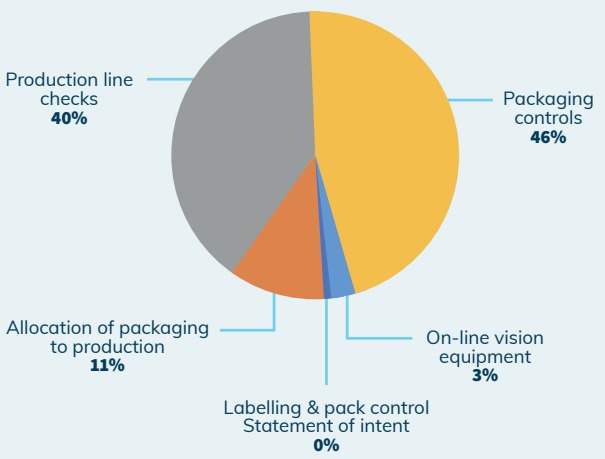
Issues and recalls are dealt with immediately and therefore will have been addressed before an audit takes place . The information given is indicative of the areas within allergen management which might benefit from site review but is not indicative of the magnitude of a problem.

Graph 1: Non-conformities against allergen management clauses (Section 5.3) of the BRCGS Global Standard Food Safety in 2021



Data from BRCGS Horizon

Graph 2: Non-conformities against packaging management control clauses (Section 6.2) in 2021



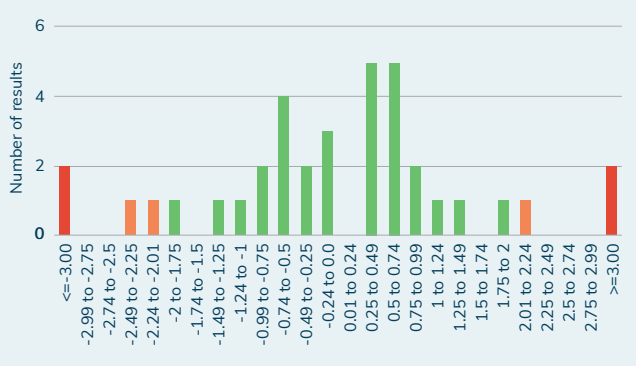
Data from BRCGS Horizon

Gluten testing in practice

Gluten is one of the allergens that is regulated across the globe and therefore it is frequently tested. The demand for gluten-free products is growing and the food industry is responding by developing new products. It is vitally important that the analysis of gluten is conducted to a high-quality degree. Participation in proficiency testing (PT) schemes is paramount in maintaining (and being able to demonstrate) analysis of high accuracy and quality.

As an example, graph 3 shows the z-score results for a proficiency testing round for a gluten in flour sample,

Graph 3: Gluten in flour proficiency testing sample - z-score results range

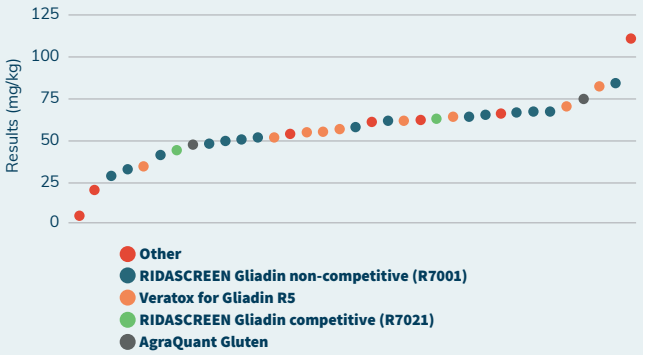


Graph data from AXIO Proficiency Testing

one of a number of allergen related proficiency testing samples available from AXIO. The z-score expresses performance of participants in the PT round, in relation to an acceptable variation of the participant result to the assigned value. For example, a z-score of 2 represents a result that is 2 x σ_{pt} from the assigned value, where pt is the standard deviation for proficiency assessment (SDPA).

In this example the majority of participants received a satisfactory performance z-score (green). The orange bars represent the number of results scored questionable and the red unsatisfactory. While just one example, this does show that allergens testing by laboratories is in most cases effective, but also that challenges do remain in a rapidly changing and complex testing landscape.

Graph 4: Distribution of results (gluten mg/kg) by method for flour in wheat proficiency testing sample



Graph data from AXIO Proficiency Testing

Gluten in wheat consists of two proteins - gliadin and glutenin - and it can be detected using several antibodies.

Graph 4 shows the most common methods for detecting gluten in food are antibody-based systems such as enzyme-linked immunosorbent assays (ELISA). Differences are also noted in the affinity of the proteins and the antibodies across different test kits and this is reflected in the results returned by participants in proficiency testing rounds. Some methods are categorised as “other” without further details provided by the participants. These methods might include other ELISA kits or other than ELISA methods like polymerase chain reaction (PCR) or Liquid chromatography coupled with mass spectrometry (LC MS MS), which are less frequently used.

Current allergen testing would not be possible without ELISA. ELISA has brought many benefits in allergen risk assessment but also risk management within the food industry. However, all current forms of allergen analysis present some weaknesses that have the potential to affect the management of risk in this area. Regular participation in quality assurance schemes such as proficiency testing assists in ensuring that the results produced from allergen testing are as accurate and reliable as possible.

LGC ASSURE offers a connected suite of solutions that intelligently analyse the safety, quality and authenticity of your goods and services, alongside evolving value drivers such as health, environmental, human welfare and ethical impact.

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Newsworthy

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Food Safety News, 8 April 2022

Corporations are (finally) starting to invest in resilient food supply chains,
Fortune, 13 April 2022

FAO, WHA and WFP on food safety accountability at GFSI Conference,
Food Safety News, 14 April 2022

Recall roundup: more Kinder products recalled in Salmonella outbreak,
New Food Magazine, 14 April 2022

Global Food Safety Initiative launches pilot for Food Safety Auditor Benchmarking Requirements,
Food Safety News, 12 April 2022

GFSI Surveys industry on action for custainable development goals,
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