

# Microbial update

## food allergens

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The term food allergy describes a specific type of immune-based adverse reaction to food. It is currently thought that approximately 2% of adults and 5% of children suffer from the condition. In the UK (population (2010) 62.3 million), this extrapolates to approximately 1.7 million individuals.

As discussed by the European Food Safety Authority (2004); food allergens present particular challenges to the food safety management practitioner, these include:

- The agent which causes the allergic reaction is often an integral component of the food.
- As already discussed only a small proportion of the population are affected.
- Levels of inevitable cross contamination by foods or ingredients within production systems, insufficient to compromise food quality, can be sufficient to cause an allergic reaction.
- A large number of foods (>170) have been identified as having been eliciting agents in cases of food allergy.

Clinically, food allergy can manifest itself in a wide variety of forms ranging from nausea through to gastrointestinal disturbances, dermal conditions such as urticaria and, in the most extreme cases, anaphylaxis and sometimes death.

For many food allergic individuals the condition is debilitating both psychologically and emotionally and often leads to an overall reduced quality of life - both for the sufferer and their family. In terms of purchasing choice therefore, the numbers of persons whose food purchasing patterns will be affected by food allergy are likely to be far higher, possibly in the range of 7-12 million in the UK alone.

### Management implications

Modern food safety management philosophy requires that food hazards be clearly defined in order to optimise processes to either eliminate or reduce the risk (probability) of the hazard occurring.

In the case of food allergy, Alldrick, (2006) proposed a generic definition of the hazard that has to be addressed as 'the inadvertent consumption of a food allergen by a

sensitive individual'. Although satisfactory at a fundamental level, given that in excess of 170 foods have been identified as being capable of eliciting an allergic reaction, some form of triage must be undertaken.

This enables food safety practitioners to focus on those allergenic foods that are the most significant in terms of consumer susceptibility.

The precedent followed by many companies within the European Community has been to focus on those foods whose presence must, by law, be indicated by reference to the source allergen whenever they or ingredients made from them are used at any level in prepacked foods including alcoholic drinks.

These foods plus sulphites/sulphur dioxide are often referred to as the 'Annex IIIa list' (European Commission, 2007) and those currently listed in the Annex are shown in Table 1.

This Annex is also used as the base list of allergenic foods for which specific controls must be exercised by food businesses who wish to be certified to the BRC Global Food Standard - Issue 6.

### Improvement & optimisation

Given that most food businesses now operate food-allergen management systems, one question that needs to be addressed is how can they be further improved and optimised. In order to do this, it is necessary to identify where weaknesses in existing systems are occurring. One source of data to inform such an assessment is the UK Food Standards Agency Allergy Alert System.

This provides a database of all food allergen related notifications made since 2007 by the food industry to the Agency. Although of necessity brief, information as to the allergen of concern, the type of food involved and the cause of the product notification is provided and this permits a generic assessment.

Fig. 1 provides a route cause analysis of 314 alerts reported up to 31st October 2012.

Consideration of these data suggests three general areas susceptible to failure:

#### ● Labelling.

This category is subdivided into two. The first group relates to alerts concerning ingredients specified in 'Annex IIIa' (see Table 1) which were either improperly described ('flour' instead of 'wheat flour') or omitted from the ingredients declaration. The sec-



**Fig. 1. Root cause analysis of allergen related alerts issued by the Food Standards Agency (2007-2011).**

ond concerns defects in any additional (and voluntary) allergen advice information provided on the label ('contains milk and eggs').

#### ● Process.

Alerts within this category relate either to operational errors during the manufacture of the food (topping a product with cheese, where no topping was specified), or using the incorrect packaging for a particular product (for example packing a custard slice in a 'cream slice' pack).

#### ● Pre-requisites.

As discussed below, pre-requisite programmes form an integral part of successful allergen management. Alerts falling under this category are subdivided into three groups, issues with raw materials (5%), cross contamination (12%) and the presence of the specified allergen in a 'free-from' product (10%).

This last group of alerts are of particular concern, since in these cases the risk to the food allergic consumer is further increased, due to products bearing such an endorsement are more likely to be purchased for the food-allergic individuals concerned.

At an operational level, given the inevitable brevity of the supporting information provided, the detailed reasons for the origin of these alerts can only be speculated on.

For example, in the case of an alert relating to the non-inclusion of an allergenic food within the ingredients declaration (33% of all alerts), this may be due to:

#### ● Human error in the design and generation of the label.

● A failure to communicate the relevant information to those responsible for label design or a change in manufacturing location.

● Practices that rendered the information provided out of date.

Similar debates can be held over the reasons behind the other alerts.

## A holistic approach

At the beginning of this article it was suggested that the principle hazard relating to the question of food allergy is 'the inadvertent consumption of a food allergen by a sensitive individual'.

For the food allergic individual the product label is the first (and perhaps only) line of defence in terms of consuming a food containing a food to which he/she is allergic to and thereby avoid suffering a (potentially fatal) adverse response.

It is therefore incumbent on food businesses not only to ensure that information on the wrapper reflects the initial reality of the production process when the wrapper is first designed, but also that subsequent day-to-day activities within the production unit are consistent with it.

This requires a holistic approach to the management of the issues and was summarised by Alldrick (2009) using the acronym PIPE (People, Ingredients, Process, Enforcement).

PIPE proposes that:

- People within a food business should understand how their own activities can impact on the risk of food allergen linked incidents occurring and how they can minimise that risk. This responsibility extends from the chief executive officer to the temporary menial worker and everyone else within the food business.
- Ingredients (raw materials) should be sourced from suppliers who can demonstrate competence in providing materials of defined food allergen risk. Once delivered on site systems have to be in place that ensure the integrity of the packing of high-risk materials and that these are handled and stored appropriately. This also applies to rework.
- Processes and supporting systems used

must ensure that the risk of inadvertent food allergen consumption is minimised. This is achieved through a number of routes including segregation of production lines, scheduling of production where segregation is infeasible and application of appropriate sanitation regimes.

- Enforcement mechanisms are in place. These should be designed to not only ensure compliance but also verify on a continuing basis that the food allergen management systems in place remain fit for purpose.

The holistic approach implicit in the PIPE suggests that, in most food businesses, control cannot be effected at a single point in the process (critical control point) but must heavily rely on the optimised operation of pre-requisite programmes. This has been recognised in a number of standards to which the industry operates to (for example BRC Global Food Safety Standard, Issue 6, British Retail Consortium, 2011) and there are numerous sources of information available to the industry in order to enhance protection of the food allergic individual through this approach.

In common with any other process to manage an aspect of food-safety, appropriate steps have to be in place with regards to verifying the efficiency of food-allergen management systems.

Typically this is achieved both in terms of a historical consideration (audit of relevant records) and measurement to an analytical end-point.

However, as already discussed, a significant number of the alerts reported by the Food Standards Agency related not to failures in pre-requisite systems normally associated with food safety management but to those ensuring the products meets other basic quality criteria.

These additional criteria include that the food contains the ingredients it is supposed to have and that the packaging contains that food which it describes.

## Conclusion

A public acknowledgement of the significance of food allergy probably began in the early 1990s following the establishment of patient organisations such as the Anaphylaxis Campaign.

Studies such as those by Grundy et al. (2002) have demonstrated that the incidence of the condition within the population is increasing and the hazard of food allergy is one that will have to be addressed for the foreseeable future.

In terms of food businesses there is a legislative framework within which to work and through collaboration with relevant Government agencies and patient organisations the food industry has responded to the challenge. Nevertheless, as discussed, there is both room for improvement and a need for continued vigilance. ■

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**Table 1. Allergenic ingredients whose presence must be clearly declared on prewrapped food (European Commission, 2007)\*.**

Cereals containing gluten (wheat, rye, barley, oats, spelt, kamut, or hybridised strains), except: (a) wheat-based glucose syrups including dextrose (b) wheat-based maltodextrins (c) glucose syrups based on barley (d) cereals used for making distillates or ethyl alcohol of agricultural origin for spirit drinks and other alcoholic beverages
Crustaceans and products thereof
Eggs and products thereof
Fish and products thereof, except: (a) fish gelatine used as carrier for vitamin or carotenoid preparations (b) fish gelatine or Isinglass used as fining agent in beer and wine
Peanuts
Soy beans and products thereof, except: (a) fully refined soybean oil and fat (I) (b) natural mixed tocopherols (E306), natural D-alpha tocopherol, natural D-alpha tocopherol acetate, natural D-alpha tocopherol succinate from soybean sources (c) vegetable oils derived phytosterols and phytosterol esters from soybean sources (d) plant stanol ester produced from vegetable oil sterols from soybean sources
Milk and products thereof (including lactose), except: (a) whey used for making distillates or ethyl alcohol of agricultural origin for spirit drinks and other alcoholic beverages (b) lactitol
Nuts (namely almond, hazelnut, walnut, cashew, pecan nut, Brazil nut, pistachio nut, macadamia and Queensland nut) and products thereof, except: (a) nuts used for making distillates or ethyl alcohol of agricultural origin for spirit drinks and other alcoholic beverages
Celery and products thereof
Mustard and products thereof
Sesame seeds and products thereof
Sulphur dioxide and sulphites at concentrations of more than 10mg/kg or 10mg/litre expressed as SO <sub>2</sub>
Molluscs
Lupin

\* This list is also used within the BRC Global Food Safety Standard, Issue 6 (British Retail Consortium, 2011) in terms of those foods for which relevant allergen control measures have to be in place.