

# Allergen update

## current perspectives

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Classical food safety management requires an understanding of the health consequences of a potential hazard, a definition of the hazard in terms of the operational parameters of the food business concerned and the factors contributing to the probability (risk) of that hazard occurring. These principles apply to the management of food allergy as well as to any other issue that may present a food safety issue to the consumer.

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. 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 pro-

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

- Cereals containing gluten (wheat, rye, barley, oats, spelt, kamut, or hybridised strains).
- Fish and products thereof.
- Soy beans and products thereof.
- Milk and products thereof.
- Celery and products thereof.
- Mustard and products thereof.
- Peanuts and products thereof.
- Sulphites.
- Crustaceans and products thereof.
- Eggs and products thereof.
- Nuts (namely almond, hazelnut, walnut, cashew, pecan nut, Brazil nut, pistachio nut, macadamia and Queensland nut) and products thereof.
- Sesame seeds and products thereof.

\*This list is also used within the BRC Global Food Safety Standard (British Retail Consortium, 2008) in terms of those foods for which relevant allergen control measures have to be in place.

portion 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.
- There are no agreed 'maximum residue limits'.
- A large number of foods (>170) have been identified as having been eliciting agents in cases of food allergy.

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

Within the EU, this triage process has been facilitated by related legislation concerning the labelling of foods. Directive 2007/68/EC (European Commission, 2007) lists 14 foods or food groups as well as one additive (sulphite), whose presence in foods must be declared on the label (Annex IIIa). These are detailed in Table 1.

This Annex is also used as the list of allergenic foods for which specific controls must be exercised addressed by the relevant sections of the BRC Global Food Standard (British Retail Consortium, 2008).

Having described the hazard it is possible to consider those factors which modulate the risk of the hazard occurring. Essentially these relate to:

- The mechanisms by which information is communicated to the food allergic individual about the presence (or absence) of allergens of concern within a particular food.
- The steps taken within the food business to minimise the inclusion of food allergens in products where they would not be expected to be present.

Much information is now available concerning the management of food allergens within food businesses. Within the United Kingdom, the Food Standards Agency has been particularly pro-active in this area. For

example in the provision of guidance documents (for example Food Standards Agency, 2006) and web based training courses (Food Standards Agency, 2009a).

### Further improvement

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 (Food Standards Agency, 2009b).

This provides a database of all food allergen related notifications since 2007 made 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 describes the 166 alerts reported in the period 2007-2009 by the Food Standards Agency on the basis of product type. A root cause analysis of the alerts, based on information provided by the Agency is shown in Fig. 2. The causes of the alerts are categorised as follows:

#### ● Labelling.

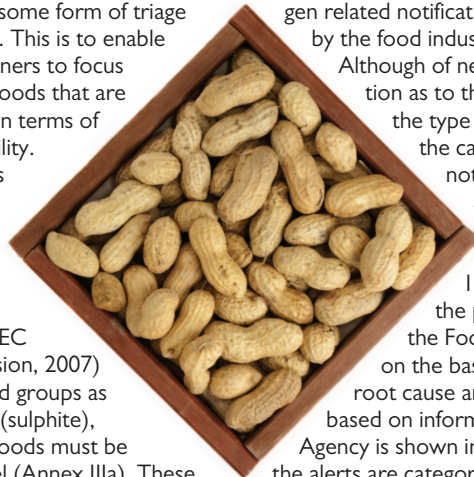
This category is subdivided into two. The first group relates to alerts concerning ingredients specified in Annex IIIa (see Table 1) which were either improperly described (for example 'flour' instead of 'wheat flour') or omitted from the ingredients declaration. The second concerns defects in any additional allergen advice information provided on the label (for example 'contains milk and eggs').

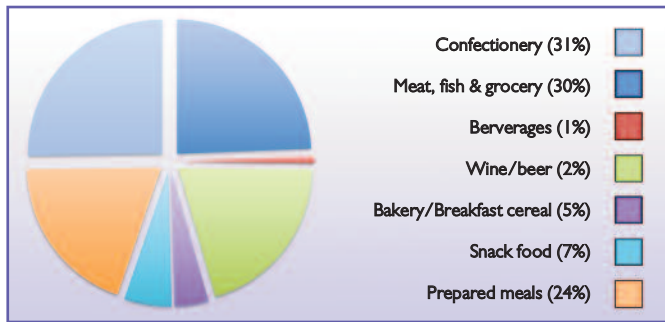
#### ● Process.

Alerts within this category relate either to operational errors during the manufacture of the food (for example 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).

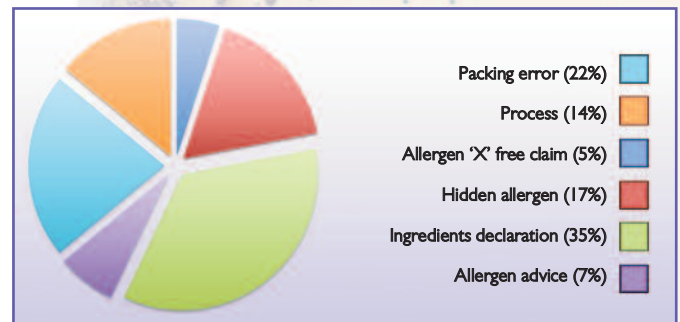
#### ● Pre-requisites.

Pre-requisite programmes form an integral part of successful allergen management. Alerts falling under this category are subdi-





**Fig. 1. Product profile of food allergy related alerts notified by the UK Food Standards Agency, 2007-2009 (n = 166).**



**Fig. 2. Root cause analysis of food allergy related alerts issued by the Food Standards Agency 2007-2009 (n = 166).**

vided into two groups. The first ('hidden allergen') relates to allergen presence occurring via an indirect route (for example cross contact or association with a particular ingredient). The second (allergen 'X' free claim), relates to management failures relating to products for which an allergen-free claim has been made and where the allergen in question has been found to be present (for example products sold as 'free from milk' containing milk protein).

Consideration of Fig. 2 reveals that 42% of the alerts reported revolved around defective labelling, while the remainder reflected failures either in the production process or in the operational pre-requisite programmes usually addressed within the context of food safety management (for example sanitation, training, rework management and supplier quality assurance).

Of greatest concern has to be those alerts relating to food products, which are endorsed as being free from a particular food allergen, but were subsequently found to contain the very same allergen (allergen 'X' free claim; 5%).

In these cases the risk to the food allergic consumer is further increased, since products bearing such an endorsement are more likely to be purchased from 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 (35% of all alerts), the question may be asked, was this 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.

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 to ensure not only 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. This 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, British

Retail Consortium, 2008). 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 (in the case of food allergens, protein or DNA based analyses for the allergenic food concerned).

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. Given the importance of the label to the food allergic consumer; it is essential that food businesses have quality assurance programmes in place that minimise the risk of the wrong ingredient being used and the product incorrectly packed. Furthermore, they also need to have systems in place which can verify the efficiency of those systems.

## 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 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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