Practical allergen control in the food industry

by Dean Hartley and Mark Swainson, Food Technology Forum Ltd, UK.

A major challenge for food manufacturers is that the industry, consumer and regulatory expectations upon the control of allergens is constantly changing as further research is conducted and best practices are developed. In addition to rapidly changing awareness and legislation, there are an increasing number of product recalls due to unexpected allergen presence or mislabelling of allergens.

The ability of a food production business to assure 'allergen free' (and often particularly 'nut free') is now one of the first questions asked of potential suppliers to the major food retailers and food service outlets, with allergen controls also scrutinised during customer and third party audits.

This article therefore seeks to outline some of the key issues in allergen control within an industrial setting, and practical ways to manage such challenges.

The most common areas requiring focus in a food manufacturing environment are as follows.

Ingredient control

To be able to control allergens, a manufacturer must gain a clear understanding of all potential allergens entering their site.

A typical approach to gain clarity upon the allergen presence within ingredients (including all sub-ingredients) is to ask suppliers to complete an 'allergen questionnaire' with specific regard to each ingredient supplied.

This questionnaire can help to determine whether each recognised allergen is present within an ingredient to be supplied and can request further details upon whether the allergen is intentionally added, or could be present due to issues such as cross contamination.

Where there is a highlighted potential for cross contamination the manufacturer can enter further discussions with the supplier in order to risk assess the potential for cross contamination. This approach could help identify whether the ingredient can still be used by the manufacturer and whether any allergen statement needs to be made upon the product labels (for example an advisory statement that 'ingredient supplier cannot guarantee nut and sesame free').

Similar risk assessment processes can also be used on other raw materials supplied to the site including processing aids, machinery lubricants and packaging. Supplier audits can be useful to prompt a review of allergen controls in place and encourage best practice in terms of allergen control and increase awareness within the supply chain.

Production processes

Where some allergen containing ingredients are used on site it is important that the manufacturer implements controls designed to prevent the allergens from gaining access into non-allergen products. Potential cross contamination points within a food manufacturing operation include:

- Handling and preparation of raw materials.
- Storage areas.
- Transport systems.
- People and people flow.
- Shared equipment.
- Proximity of production lines.
- Transfer via air particles/aerosols/air flows.
- Rework practices.
- Packaging.
- Processing aids.
- Machinery lubricants.

Appropriate measures to then reduce the risks of cross contamination will vary dependent upon the nature of the business.

Such control measures can include:

- Clear allergen identification labeling at each stage of the operation.
- Storage in sealed containers.
- The use of segregated allergen stores.
- Separate (dedicated) allergen production areas/processing lines.

Where the processing of allergens cannot be fully segregated, businesses will often seek to schedule the preparation and processing of allergen containing products at the end of the production cycle followed by thorough 'allergen clean downs' which will use 'allergen only' colour coded cleaning equipment and are validated to be sufficiently rigorous in removing all traces of the allergens from the process equipment and associated areas before the next non-allergen containing product is to be produced.

The physical status of an allergen containing ingredient can pose particular control challenges. Powders are often viewed as being one of the most difficult formats to contain, followed by liquid products and finally solid products.

Cleaning controls

Cleaning is a critical part in the control of allergens within food processing environments and, unfortunately, there are no hard and fast rules over what methods are acceptable and work most effectively.

There are six aspects of cleaning which need to be considered in the control of allergens on food production equipment:

- **Utensils and small/mobile equipment.** These are normally cleaned throughout the day in washrooms and sinks. If the allergen contact utensils are cleaned first, and the sink, wash water and environment not cleaned down, subsequent items can become contaminated with allergenic residues. The order of cleaning, and the training of staff are the main controlling factors.
- **Tray and rack washers**. As above, the order of cleaning is important when considering washing trays and items through an automatic washer. Any allergen introduced into the wash water can theoretically contaminate all subsequent washed items. It is therefore important that allergen contact items are cleaned last when possible, or immediately prior to a full cleandown of the washer and surrounding environment.
- **Break cleaning.** Assuming production planning allows for a steady progression on a line from low risk to higher risk allergen containing products, the main issue for break cleaning is to achieve a visually clean standard. To this end, mild or neutral cleaning detergents are frequently used. The over-riding control at this point is the standard of visual inspection, which should be undertaken by QA/QC, and the line not released back into production until the specified standards have been met.

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- **Deep cleaning.** When a line or area contaminated with allergenic soiling is being cleaned, it is important that the staff are aware of the risks associated with the transfer of allergens to the next scheduled product and to other areas of the factory, and so good training and awareness is essential. For critical areas, a rapid protein detection swab should be used to verify that the agreed standard of clean has been achieved.
- **Cleaning equipment.** Often overlooked, cleaning equipment itself can prove a very effective vector in transferring allergenic material around a production area. In order to control the spread of allergens, re-usable cleaning equipment and products should be thoroughly cleaned themselves after use in an allergen containing area.
- **CIP.** With CIP, a major influence on allergen control is whether or not it is a total loss system or make-up system. If all the detergent is dumped after each cycle (total loss), there is less chance of carry-over from allergenic to non-allergenic products. A system which permanently tops up a tank of hot caustic will need to be drained and cleaned after an allergen cleaning cycle.

In addition, the cleaning of processing equipment can be made more difficult by poor hygienic design/inaccessible areas, therefore manufacturers should consider such aspects during their allergen risk assessments on site and when sourcing new equipment.

The importance of training

Managers within a food production business can place a great deal of time and effort into allergen risk assessments and the design of allergen control measures which will provide the most benefit to their particular manufacturing site, however all such efforts can be undermined if factory staff are not made fully aware of such threats to product safety, or do not adhere to the controls due to the risks being poorly understood or the control measures themselves being impractical.

It is therefore of vital importance that food manufacturers train all of their staff upon the consumer risks posed by allergens, the specific allergens present within their particular operation and the control measures required to be adhered to in order to guard against the potential for cross contamination. These measures may include the use of allergen specific handling utensils/cleaning equipment personal protective equipment (PPE), and awareness upon the importance of handwashing and kit changes/disposal at the appropriate times.

Staff should receive their allergen control training before they are allowed to commence work and should also receive routine refresher training at regular intervals. Staff understanding of the allergen training should be assessed by confirmatory tests following training and their compliance with the allergen control requirements should then be monitored by supervisory checks and technical audits. The content of such staff allergen training should also be utilised for the briefing of site visitors and contractors upon the dangers of allergens and the controls in place on site which must be adhered to at all times.

The future

There can be little doubt that the number of declarable allergens on pre-packed foods will continue to expand throughout the world, as more research becomes available on specific allergenic compounds.

However, the continued research on threshold amounts, and the potential adoption of such related limits by individual countries could mitigate the increased level of labelling information required.

For example, the adoption of an agreed ppm level of an allergen in a food before declaration is required, can allow for simple testing by the food manufacturer to verify the food is below declarable limits.

In reality, the major defence of all food manufacturing establishments will rest on the strength of their allergen control systems and adherence to good manufacturing practices. ■

✉ info@foodtechnologyforum.co.uk

Table 1. Top tips for allergen control in food manufacturing environments.

Ingredient supply
Can your supplier use different coloured containers or packaging (or even packing tape) to help highlight allergen containing products?

Raw material storage
Remember to consider air flow and conditions when storing products. Simple controls such as storing allergenic powders away from draughts and doorways can help to reduce the risk of cross contamination.

Preparation
If you are weighing allergenic ingredients for addition to a product, is this something that one of your suppliers could do? Opening a sachet or bucket of pre-mix is far less likely to spread allergens to the surrounding area.

Defrosting
Drip loss can carry allergenic proteins! Frozen products such as fish and shellfish need to be kept away from other products when defrosting.

Mixing
Mixing speeds on many types of vessels can be adjusted. Consider the effect the impeller speed may have on the potential to spray or atomise an allergenic ingredient.

Belts
A packed allergenic product poses a lower risk to people and production equipment. Can the product be placed into a tray or packed at an earlier stage?

Mobile equipment
How can you be sure that all mobile equipment has been cleaned after handling an allergen containing product? Numbering all mobile equipment and recording evidence of cleaning each particular number can demonstrate control.

Waste control
Spillage from over-filled and open bins can occur when waste is removed from an area. Using closed top waste containers can effectively reduce the risk of the allergen spreading to other areas.

Cleaning
Check the IP rating of your equipment. The higher the IP rating, the less likely it is for particles to become trapped in certain pieces of equipment. This can serve as a quick guide to where potential hard to clean areas can be.

Staff awareness
Many government bodies and allergen websites produce a regular list of the amount and type of product recalls attributed to allergen contamination. Displaying this information regularly on the noticeboard can help to remind staff of the importance of maintaining good allergen control (and the cost when it goes wrong!).

Hand hygiene
Cross contamination from hands is a common cause of allergen spread within food production operations. Using a specialist dye and an ultraviolet light can demonstrate the rate of spread of allergens within an area from the hands.

Procedures
Your glass control policy will often include most of the procedures necessary for controlling spills of allergenic products. It can therefore be used as a quick-start to implementing an allergen spillage procedure.