Table 25.2 Potential sources of allergens into the production process.

Potential direct source of allergens into a product	Potential indirect sources of allergens into a product (cross-contact)		
Materials used to make the product	Equipment used to make the product	Raw material storage and handling	Other shared resources
Ingredients	Shared production line	Storage areas	People
Rework	Shared process equipment, e.g. mixers	Transport	Cleaning equipment
Processing aids	Pipelines and storage tanks	Ingredient handling, e.g. scoops	Maintenance tools
Packaging	Shared wrapping machinery	Rework and semi-finished product containers	Air handling

The confectionery industry faces challenges with allergen management, as the first six types of allergen in the above list are commonly used in the manufacture of confectionery products.

When determining allergen management programmes in confectionery factories, it is important to consider the various routes by which allergens may be present in the finished product. Table 25.2 shows the potential sources of allergens into the production process.

25.7.1 Allergens as ingredients

These are the easiest to consider, as they are primary ingredients of the product and should be well known, such as milk used in the manufacture of milk chocolate, lecithin if derived from soya, peanuts or tree-nuts used as inclusions, for example in moulded tablets and wheat gluten found in wafers or biscuit inclusions. However, it is fundamentally important to find out information about the ingredient's composition and the supplier's process, as there may be minor components of an ingredient that may contain a major allergen, or cross-contact due to shared production lines, equipment or transport used by the supplier. This information needs to be carefully assessed, to understand the hazard it presents to the finished product – will it require labelling, or is it possible for the supplier to apply further controls to exclude the allergen.

Another important consideration is rework – it has to be considered as an ingredient of the finished product, and all sources of rework, and potential allergens contained within it, must be known. Rework should ideally be reused back into the same product (Chapter 17). If this is not feasible, it must not contribute additional unlabelled ingredients, especially unlabelled major allergenic foods from ingredients, additives or processing aids into the product in which it is used.

25.7.2 Allergens from cross-contacts at the factory

Due to the diverse range of confectionery products manufactured, their frequency of change and new product development, coupled with the economic necessity for flexible production lines, it is quite common for a production line to manufacture a number of different products. Compounding this problem is the difficulty in thoroughly cleaning confectionery lines – in fact, as already discussed, dry cleaning is the normal method to minimise microbiological risk, but this naturally leads to some levels of residue remaining on the line. All this leads to the necessity to very carefully consider the allergen hazards across the full portfolio of products made on the same production line, as residues can easily remain in the equipment on changeover from one product to another. This is particularly the case for ingredients of a particulate nature, such as peanuts and tree-nuts, where particles or dust of the ingredient are not homogeneously distributed and may collect and later dislodge from hidden areas of the process.

Additional allergen cross contacts must also be considered within the factory environment as a whole – if an allergenic ingredient is used on a production line in only one part of the factory, there may be still be possibility that cross-contact can occur through the use of shared materials and tools. Examples of this include plastic containers use to store or transport rework or semi-finished products, cleaning tools and materials used for food contact such as ingredient scoops, or maintenance tools. Also cross-contacts must be considered for shared items of processing equipment – for example mixers that may be used for different products or processes.

Allergen assessment in the factory must be extremely thorough and systematic to ensure that the full range of ingredients, products, processes and procedures are considered in the factory, and all possible allergen sources are identified.

25.7.3 Control measures

For each allergen hazard identified, it is essential that an effective control measure is in place. For allergens present as an ingredient, the control is the clear labelling of the ingredient on the packaging. For minor ingredients that contain an allergen that otherwise would not be present in the ingredients list, it is good practice to consider whether it is feasible to replace the ingredient with one that has similar functionality, but that does not present an allergen hazard.

For allergens present as potential traces in the finished product due to cross contact, precautionary labelling of the finished product should be the last resort, in order to offer the allergic consumer the widest possible choice of available products. First, other means of controls should be evaluated, for example using dedicated processing equipment, or a dedicated colour coding system for storage containers to segregate products that contain allergens. Any such system must