

Allergen management in food: from detection to protection

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Introduction

Food allergies arise from immune reactions to certain proteins in food, which can trigger mild to severe reactions, and in some cases, anaphylaxis (a severe, potentially life-threatening allergic reaction). For individuals with allergies, even trace amounts of allergens can pose serious health risks. As the incidence of food allergies rises globally, accurate allergen analysis has become a cornerstone in food safety to ensure products are safe for consumption. It is crucial for food companies to thoroughly understand their production processes and maintain open communication with suppliers to identify where allergens are present or where the risk of contamination is highest, ensuring accurate labelling of their products. This empowers customers to make safe dietary choices and reduces health risks.

Regulations

European legislation, particularly Regulation (EU) 1169/2011, plays a central role in ensuring food safety by mandating clear labelling of allergens in food products.

This regulation specifies 14 allergens that must be disclosed when used as ingredients, including gluten, soy, peanuts and milk (Figure 1). For most of them, no clear concentration limit is stated from which point the allergen must be labelled. If they are deliberately used as an ingredient, it must be clearly mentioned on the label. The only exception is sulfur dioxide and sulfites, which must be labelled if their concentration exceeds 10 mg/kg or 10 mg/L, as they pose a lower allergenic threat than others.

Additional regulations, such as (EU) 828/2014, set specific thresholds for gluten labelling:

- **“Gluten-free”** means that a product contains no more than 20 mg/kg of gluten, ensuring suitability for people with celiac disease.
- **“Very low gluten”** refers to products with no more than 100 mg/kg of gluten.

By adhering to these regulations, food producers demonstrate commitment to safety and compliance, safeguarding the well-being of consumers with specific dietary needs.

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Figure 1: Allergens that must be mentioned on the food label if used as an ingredient

Precautionary Allergen Labelling

Precautionary Allergen Labelling (PAL) serves as an additional safeguard, alerting consumers to the possibility of allergen cross-contamination. PAL statements, such as “*may contain*”, are used on food labels when there’s a potential for unintended allergen contamination due to shared facilities, transport, or handling practices. While PAL helps protect consumers, it also poses challenges for producers, who must determine the likelihood and degree of cross-contact to label appropriately.

One of the primary difficulties in PAL lies in balancing consumer protection with clarity. Excessive or unnecessary PAL statements can lead to “label fatigue”, where consumers may begin to ignore warnings due to overuse. To counteract this, producers need to apply PAL consciously. Reference doses, which are mentioned in the paragraph below, can help with this by providing the thresholds to determine when PAL should be employed. If allergen levels in a product are below the established reference dose, manufacturers might consider it safe to omit PAL. Conversely, if allergen levels are at or above this threshold, PAL may be warranted.

Reference Doses

Reference doses are established thresholds used to determine the levels of allergens in food products that are considered safe for individuals with allergies. These doses are often derived from scientific research and expert consensus, assessing the quantity of an allergen that can be consumed without triggering an allergic reaction in the majority of sensitive individuals. These reference doses are carefully determined to minimize the risk of allergic reactions in sensitive populations. However, it's important to note that these values are not intended as criteria for claiming that a product is “free” of specific allergens.

Analytical Techniques

To accurately detect and quantify allergens in food products, a range of analytical techniques can be used, each with unique strengths and limitations. The following methods are commonly used in allergen analysis:

ELISA (Enzyme-Linked Immunosorbent Assay)

ELISA is known for its high sensitivity and ease of use. Its reliability and accurate quantification has led to widespread use in the industry. One potential challenge of ELISA is cross-reactivity, where ELISA antibodies may react to similar proteins from different sources. This cross-reactivity can result in false positives, where the test detects proteins from non-allergenic sources, complicating the interpretation of results. Therefore, understanding the specificity of the antibodies used in ELISA is crucial to ensure accurate allergen detection.

PCR (Polymerase Chain Reaction)

PCR is effective for detecting allergen-specific DNA, which is particularly advantageous for processed foods where proteins may be degraded.

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Its capacity to simultaneously test for multiple allergens allows for efficiency in multi-allergen analyses. Nevertheless, PCR targets DNA rather than proteins, which may not always correspond directly to allergenic activity.

However, the technique is not yet fully scaled for routine allergen testing and faces limitations related to higher costs and challenges with sample throughput, making it less common in commercial settings.

LC-MS/MS (Liquid Chromatography-Mass Spectrometry) Tandem Mass Spectrometry)

LC-MS/MS offers highly accurate protein detection, positioning it as a promising tool for the future of allergen testing. Its precision is especially valuable for detecting multiple allergens simultaneously at trace levels.

You can rely on us

This information sheet only provides a handful of examples, rendering it far from a complete overview of contamination sources. If you would like to find out more information on this topic and the analyses we offer, please do not hesitate to contact our customer care service.

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Quality and reliability of our analyses is key to us, which is why our in-house R&D team is continuously working to improve our existing methods as well as developing new relevant methods based on market trends. Furthermore, our pesticide analyses are **BELAC** accredited conform the requirements of the EN **ISO/IEC 17025:2017** standard. In addition, we have **various recognitions** to further ensure the quality and relevance of our analysis scope. Below just a selection of our current recognitions.

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