

Management of allergens in the gastronomy

Difficulty of cross-contamination referred to the context of food regulatory

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Summary

The new EU Food Information Regulation, which comes into effect on 13 December 2014, provides for the compulsory labelling of all allergens subject to labelling requirements on unpacked food. Different restaurants and gastronomy/catering businesses will be required to clearly identify all allergens appearing in dishes, e.g. on the menu. The catering industry will also be subject to an additional requirement: assessing the risk of cross-contamination.

This was visualized in this study by means of film recordings during routine stages of food production and/or preparation. In parallel, allergen test strips from Romer Labs® were used to analytically detect "carried over" traces of allergens. This potential danger could be minimized by regular hygiene measures (washing hands with detergent, disinfection). The implementation of this labelling requirement is made more difficult by the absence of so-called threshold values for all 14 allergens. Hitherto, threshold values exist only for sulphites and gluten.

Keywords: Food Information Regulation, allergens subject to labelling requirements, restaurants, gastronomy/catering businesses, cross-contamination, hygiene measures

ing food preparation in kitchens or industrial kitchens. Practical methods for prevention are demonstrated.

Food intolerances, as distinct from immune-mediated food allergies and non-immunological food intolerances, are becoming more prevalent. Identifying suspect foods in the course of industrial food processing is increasingly difficult. The processing of basic foodstuffs used as auxiliary materials (e.g. lactoprotein, egg) in the smallest amounts, which are not expected in the processed food, can exacerbate the situation for allergy sufferers [1, 2].

Definition of cross-contamination – Undesired carry-over of allergens

Undesired ingress or carry-over of allergens during production, storage or transport is currently not fully regulated from a legal point of view. In that regard, it is essential, in the interest of good manufacturing process (GMP), that every effort is made to prevent the accidental ingress of allergens into the food (cross-contamination), which is unplanned according to the recipe. If this possibility cannot be excluded, there is also the option of providing voluntary information on the pack-

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Introduction

The new Food Information Regulation will regulate allergen labelling for unpacked food from 13 December 2014 in the European Union, which will affect restaurants and gastronomy/catering businesses, among others. This article provides an insight into the problems of allergen cross-contamination, ascertained by means of film recordings and analytical allergen detection dur-

aging (trace labelling, trace information) [3]. Ultimately, it is incumbent on the food manufacturers, depending on existing product liability, whether and, if so, how such information is affixed. As there are no standardised prescriptions, various methods are used to display this information, which, however, often allow no conclusion to be drawn about the actual content of allergens in the final product.

Threshold values as possible support for allergen labelling

The Bundesinstitut für Risikobewertung (BfR) (Federal Institute for Risk Assessment) and the Max Rubner-Institut (MRI) are currently addressing the subject of threshold values for allergens in food and the question of how these could help in the labelling of allergenic foods.

One prerequisite for establishing threshold values is a reliable analysis for determining the allergens present in a product. The objective of these threshold values is to protect allergy sufferers from various allergic reactions.

It is worth noting that reactions to allergenic components in food are highly individual, as is the dose required to cause such a reaction. The allergenic dose can also be co-determined by external environmental factors (e.g. medication, nicotine and alcohol, physical and mental condition). Defining a threshold value for a certain allergen serves primarily to verify that allergic reactions should not be expected among affected persons below this threshold value [4]. An absolute minimum level (no observed adverse effect level, NOAEL), i. e. a value, at which no patients react in any way, could be determined for the fewest allergy triggers [5–8].

By reference to data from scientific studies on amounts that trigger allergic reactions, based on threshold

values, limit values were determined for the main allergy triggers (e. g. for sulphites, given in SO₂) [4].

Current legal situation – Allergen labelling

Regulation (EU) No. 1169/2011 on the provision of food information to consumers was issued at the end of November 2011 and is directly applicable in all member states [9]. It will replace national labelling provisions, e.g. in Austria the previously applicable provisions of the Food Labelling Regulation [10] and the Nutritional Labelling Regulation BGBl. No. 896/1995 [11]. This new Food Information Regulation provides for the compulsory indication of key allergy triggers subject to labelling requirements on unpacked products, so-called loose goods, from December 2014 [9]. This labelling requirement affects all departments in supermarkets, the bread/bakery range in bakers, as well as restaurants, community catering businesses and bistros. The key allergy triggers subject to labelling requirements according to Appendix II of Regulation (EU) 1169/2011 [9] are illustrated in ♦ Overview 1.

Until 13 December 2014, the compulsory indication of allergens subject to labelling requirements applies exclusively to packed products. In future, according to Article 21 (1) b of Regulation (EU) 1169/2011, the names of substances or products listed in Appendix II, which trigger allergies or intolerances, must also be indicated in writing in the list of ingredients on packed products, in such a way that the substances or products are set apart from the other ingredients (e. g. by the font, style or background colour). In the event that no list of ingredients is provided, the word “Contains”, followed by the names of substances or products listed in Appendix II, must appear [9].

Relevant substances or products which trigger allergies or intolerances

- cereals containing gluten (wheat, rye, barley, oats, maize, spelt, kamut or hybrid varieties)*
- crustaceans*
- eggs*
- fish*
- peanuts*
- soybeans*
- milk (including lactose)*
- nuts (almonds, hazelnuts, walnuts, cashew nuts, pecan nuts, brazil nuts, pistachio nuts, macadamia nuts or Queensland nuts)*
- celery*
- mustard*
- sesame seeds*
- sulphur dioxide and sulphites in concentrations of more than 10 mg/kg or 10 mg/l, as total present SO₂
- lupines*
- molluscs*

*and derived products [9]

Overview 1: Key allergy triggers: 14 product groups subject to labelling requirements

Research question

This investigation is an explorative study focusing on the feasibility and monitoring of possible allergological risks in food preparation. Overall, six Austrian restaurants and community catering businesses took part in the investigation. The central question was whether, in the catering industry – with the kitchen as a starting point –, there was a risk of allergen cross-contamination during the stages of production and preparation and/or serving of food (canteen, buffet). The extent to which key allergy triggers carried-over could be analytically detected in the routine cooking process and the possible

practical measures to avoid the risk of allergen cross-contamination as far as possible were also of interest.

Methodology

At the beginning of the study, restaurants and catering businesses were informed about the research by means of an information letter. The study participants were: two community catering operations in Innsbruck (Tyrol), a community catering operation in Werfen (Salzburg), a high-class restaurant, an Italian café/restaurant and a bistro in Salzburg.

Firstly, a problem-centred interview was carried out with the management based on an interview guide (assessment sheet). Information obtained was documented in writing in the assessment sheet.

The food preparation stages were filmed at different times (breakfast

preparation, preparation for midday or evening meal). To guarantee data protection, all filmed persons signed a consent form. The film sequences (for each business) were regularly encoded and illustrated in table format in Excel. This provided an overview of the entire film material. The encoding was always made up of the letter S (for sequence), a consecutive number, e.g. 1, and the name (◆Figure 1).

Allergen test strips by Romer Labs® were used for the analytical allergen detection.¹ Casein, gluten G12 and egg test strips were used for the study; samples were taken using the “SWAB” method [12] (wiping movements with a swab on potentially contaminated surfaces). For each allergen the prime activity areas – work surfaces (e.g. cutting board), tools or devices (e.g. knife) and hands or gloves – were tested.

After an incubation period, the test strips showed a positive or negative test result. The test strips used were photographed and archived directly after the result was indicated. The

data captured from film material and test strips was written up in the in-house presentation of results, evaluated (transfer of film/picture into written language) and interpreted. Based on the film material and the results from corresponding allergen test strips, situations where allergen cross-contamination can arise were conclusively verified.

The final report of observation records completed the study. This information (e.g. situations during the food preparation processes at other locations in the kitchen, which were not captured by the camera) supplemented the film recordings and supported the rationale for the use of a test strip as well as its interpretation.

Results

Due to significant operational individuality, a separate presentation of results was produced for each business: Firstly, the business was presented based on the information obtained from the problem-centred interview, then the evaluation of the

¹Immunological test strips in lateral flow format

Sequence	Name of Sequence	Use	Note
S50	Workplace toast and salad1	✓	
S51	Workplace toast and salad2	✓	
S52	Workplace toast and salad3	✓	
S53	Workplace toast and salad4	✓	
S54	Workplace toast and salad5	✓	
S55	Workplace toast and salad6	✓	
S56	Salad finishing	✓	
S57	Chopping board Bread cheese sausage egg1	✓	
S58	Chopping board Bread cheese sausage egg2	✓	
S59	Chopping board Bread cheese sausage egg3	✓	
S60	Workplace Bread cheese sausage egg cleaning	✓	
S61	Cutting machine1	✓	
S62	Cutting machine2	✓	
S63	Cutting machine3	✓	
S64	Selling bread rolls	✓	one bread tongs for all bread rolls
S65	Milk frother	✗	Only info for observation record: soya/milk – lactose

Figure 1: Film sequences for Business C Innsbruck [own illustration]

business profile and assessment record followed. The next focus was the description of the film material, the evaluation of test strips and the final interpretation of results. The following relationships were perceived in the data collected:

1. From the data on the six businesses studied, it appears that cleaning the work surfaces, tools or hands and gloves with water only (without detergent or soap) is not sufficient to prevent cross-contamination of an allergen into another foodstuff.
2. Furthermore, the interpretations show that cleaning the work surfaces, tools or hands and gloves with detergent or soap is mostly² sufficient to prevent the undesired carry-over of allergens.
3. A significant risk of allergen carry-over is presented by the reuse (observed in all businesses) of various tools (knife, cutting board, cutting machine), without these having been sufficiently cleaned between the different stages of preparation (dishwasher, water with detergent).

In summary, a table of all used test strips in the respective businesses was created for each tested substance, showing the associated result and hygiene measures used (cleaning with water only, with water and soap or with water and detergent). ♦ Figures 2–4 show the results and hygiene measures for the allergens egg, casein and gluten.

Discussion

The study investigated the problem of cross-contamination in six different businesses, from high-class restaurants³ to community catering in a canteen. Each business was observed individually and the results were separately presented and interpreted. The results provide starting

Allergen: Egg			
Business	Work surface	Work tools	Gloves
Business A	negative	negative	positive
Hygiene measures	water	water & detergent	none
Business B	positive	negative	positive
Hygiene measures	water	water & detergent	water
Business C	negative	positive	negative
Hygiene measures	water	none	water & soap
Business D	negative	positive	positive
Hygiene measures	none	dry	none
Business E	positive	positive	positive
Hygiene measures	none	none	none
Business F	positive	positive	positive
Hygiene measures	water	water	water & soap

Figure 2: Overview of hygiene measures and results of used egg test strips

Allergen: Casein				
Business	Work surface	Work tools 1	Work tools 2	Gloves
Business A	positive	positive		positive
Hygiene measures	water	water		water
Business B	positive	positive		positive
Hygiene measures	water	water		none
Business C	positive	positive	positive	positive
Hygiene measures	none	none	water	water & soap
Business D	positive	positive		positive
Hygiene measures	none	none		water
Business E	positive	positive		positive
Hygiene measures	water	water		none
Business F	positive	positive		positive
Hygiene measures	water	Water & washing up liquid		water

Figure 3: Overview of hygiene measures and results of used casein test strips

points and tips to recognise complex relationships where cross-contamination can arise. Further studies are required, specialising in one particular form of catering. Another discussion point is the analysis by means of allergen test strips. The results of the test strips visualised possible allergen residue, however, they provided no evidence of quantity.

When the suspicion of an undesired allergen carry-over emerged during filming, a test strip was applied.

²See the comments on the so-called Hook-Effect in the discussion.

³In this context “high-class” restaurants refer to those awarded “hats” by *Gault-Millau* – comparable to the “stars” awarded by the *Michelin Guide*.

Allergen: Gluten			
Business	Work surface	Work tools	Gloves
Business A	negative	negative	positive
Hygiene measures	water & washing-up liquid	water & washing-up liquid	water
Business B	negative	negative	
Hygiene measures	water & detergent	water & detergent	
Business C	positive	positive	
Hygiene measures	water	water	
Business D	positive	negative	negative
Hygiene measures	dry	non, poss. Hook-Effect	non, poss. Hook-Effect
Business E	positive	negative	negative
Hygiene measures	none	non, poss. Hook-Effect	non, poss. Hook-Effect
Business F	negative	positive	negative
Hygiene measures	water	water	water & detergent

Figure 4: Overview of hygiene measures and results of used gluten G12 test strips

These test strips often showed a positive result for the three selected substances. The conclusion can therefore be drawn that there is a risk of allergen cross-contamination. There was no way to detect how the previously-tested allergen came to be found on the contaminated “risk food” and, in that event, whether the dose was enough to provoke an allergic reaction. The way in which allergens are carried over when different products are prepared on the same work surfaces, without these being cleaned sufficiently between stages of production, could be an approach for a further study, with the aim of identifying the distribution of residual allergens on a new food-stuff.

In order to create a comparison of the data and results and to recognise relationships, further specialised studies on this question are required. Possible variants, to compare data and results, could involve specialising in a particular form of catering (canteens, gourmet restaurants) or quantifying the allergen residue on a surface and/or a contaminated food, e. g. by means of ELISA.

In some gluten G12 test strips the possibility of the Hook-Effect was discussed when the results were read. This states that a presence of more than 1 % of the allergen to be tested (10 000 ppm) in the previous sample can lead to a false-negative result [12]. This effect was observed in the above-mentioned study when the test strips were interpreted.

Conclusion

The specification of a 0 ppm limit for allergen labelling on unpacked products by the new Food Information Regulation will not only make it difficult for restaurants to offer a varied and changing menu. Above all, awareness and knowledge of allergen cross-contamination will need to be increased in the cooking and service industry. In order to comprehensively list the substances or products which provoke intolerances that appear in a dish, chefs must use recipes. To fully label these key allergy triggers, everything must be cooked strictly according to the recipe, in order to keep track of allergens. In practice, this limits chefs' creativity. The way in which the la-

belling of key allergy triggers will be designed in future is still to be determined. In this regard, national provisions are still to be issued. The creation of guidelines and handling recommendations, concerning the labelling responsibility of restaurateurs and caterers, is also extremely important.

Aside from the challenges outlined above, the new Food Information Regulation, by means of labelling allergens contained in dishes, has the potential to make the restaurant and catering sector more transparent for food allergy sufferers.

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Conflict of Interest
 The authors declare no conflict of interest according to the guidelines of the International Committee of Medical Journal Editors.

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