ALLERGENS MANAGEMENT SYSTEM IN THE FOOD PRODUCTION

Vesna Gojkovic1*, Zeljka Marjanovic-Balaban2, Milan Vukic1, Radoslav Grujić1, Brane Novaković3

1Faculty of Technology - Zvornik, University of East Sarajevo, Vuka Karadzica 30, East Sarajevo, Bosnia and Herzegovina
2Faculty of Forestry, University of Banja Luka, Stepe Stepanovića 73, Banja Luka, Bosnia and Herzegovina
3Development Agency EDA, Djure Jaksica 11, Banja Luka, Bosnia and Herzegovina

*e-mail: vesna.gojkovic@yahoo.com

Abstract

The share of the population that has symptoms of intolerance or allergic reactions to food is increasing. Having in mind diversity of food ingredients, consumers are increasingly demanding avoidance or clear labelling of these substances, thus a challenge faced by the producers and distributors of food products is great. This paper presents a developed allergen management system in the production and packaging of powdered food products with different allergens contained. The key elements of established system are related to effective planning of production, cleaning of production lines, separation, and proper food product labelling. Verification procedures for implemented allergen management system and possible cross-contamination was performed by ELISA method. The following ELISA methods were carried out: ridascreen 7100, veratox 8410, veratox 8470, respectively gluten, soya, and milk allergens. Established methods for the validation of allergen management system showed that the system is set up effectively.

Established verification procedures in the allergen management system confirm that system implementation is performed according to the defined plans and that with the application of other prerequisite programs, this system guarantees that the allergen contamination of food products is reduced to a minimum.

Key words: Food allergens, Allergen management, Prerequisite programs.

1. Introduction

Food products should ensure adequate intake of nutritional ingredients necessary for human function. However, some products can contain substances which cause so called “unwanted reactions” in an organism. These reactions are numerous and can be manifested in various ways. The most frequent unwanted reactions to food are allergic reactions. They are a reaction of an immune system to the presence of certain food ingredients (proteins most often), which, if taken into an organism, are capable to cause an unwanted reaction [1]. Food can cause different types of reactions, but the most important ones are those which influence the immune system causing it to start producing IgE antibodies.

It is estimated that 2 - 4% of population in Europe is allergic to food. Data about young population are even more unfavorable: 5 - 8% of children show some kind of allergic reactions to food. 10 - 20 million people in the European Union are highly sensitive to certain types of food. There are estimates which say that 20% of total European population is allergic to food [2]. In European White Book on Allergy [3], it is stated that in the period between 1960 and 1970 number of persons with atopic allergy symptoms rose by 100%, and in the period from 1980 to 1997 number of people suffering from it rose 2 - 3 times in all European countries. Currently, 25 - 30% of people in Europe suffer from some form of allergy (5 - 8% adults and 10 - 15% children).

Most allergic reactions to food disappear in most children aged 5 - 7. In rare cases (reactions to peanut or fish) reactions are long-lasting. In practice there are no medicines for food allergies, because of which most individuals have to avoid food which contains ingredients causing allergic reactions [4, and 5]. Expenses of treatments of patients sensitive to food allergens are very high (for example, 29 billion euros are spent in Western Europe) [2].
Symptoms of allergic reactions include one or more of the following problems:

- skin problems (nettle rash, itching, dermatitis, eczema, conjunctivitis, swelling of lips, problems inside the mouth),
- respiratory problems (asthma, breathing difficulties, rhinitis, throat swelling) and
- gastrointestinal problems (nausea, stomach ache, vomiting, diarrhoea).

In some cases reactions can lead to sudden fall in blood pressure, narrowing of respiratory airways, shock reaction and failure of some organs [4]. In the most severe cases this can lead to death within one minute.

An example of illness caused by allergy to food ingredients is celiac disease. Celiac disease is an autoimmune disorder caused by the presence of gliadine, i.e. prolamin (protein gluten) which can be found in wheat and similar grains, which is not IgE mediated. Problems are manifested as a disorder in functioning of intestine in genetically predisposed people. It is estimated that 1% of people worldwide show symptoms of celiac disease [6]. Special attention is paid to allergy testing of genetically modified food [7, 8].

Allergy to milk proteins is frequent with infants younger than 3 years. It happens in 3% of children. When they are older 70 - 90% of children become tolerant and age out of allergies [9].

Food which can cause allergic reactions in sensitive individuals can be different. The most common causes of allergies are: grains that contain gluten, milk, chocolate, eggs, peanuts, nuts, fish, molluscs, soybean, crustacea, sesame seeds, celery, SQ, [10, 11, and 12]. These eight food products cause more than 90% of all allergic reactions to food. Allergic reactions to soybean, milk, eggs and flower are most common in children and they usually become less sensitive to this food eventually [13, and 14]. Allergies to crustacea (shrimp, crab, lobster, etc.) and fish usually develop in adulthood, whereas allergies to peanuts and nuts equally affect children and adults, and last throughout life. Proteins from leguminosas, among which are soybean proteins, have special status when it comes to the attention that has to be paid while eating. Out of 34 proteins with antigen behavior in soybean flower, 17 are IgE reactive and are allergens [15]. Milk of different kinds of mammals, except for camel milk, has identical proteins which have similar immunological properties. In literature, information can be found saying that goat, horse, donkey milk have certain properties due to which they can be used as a material for production of anti-allergy products.

Special attention is paid to a large number of additives which can be found in food, especially additives acquired through different biotechnical procedures. These substances are responsible for causing allergic reactions in sensitive people.

Food allergies can be mild but unpleasant, but also can have serious consequences with fatal ending for those who eat food which contained potential allergens.

Every process influencing the change of protein structure can potentially cause an allergy [16]. Processes during food production and processing induce more physical, chemical and biochemical protein changes influencing the protein potential to become allergenic. Certain procedures in food industry can increase, decrease and totally eliminate this property of proteins [17]. In order to prevent an allergic reaction in some cases it is enough to eliminate certain fractions of proteins from a product. Effectiveness of conducted activities can be very effectively tested by using fast test methods [18].

The most common advice to the allergic persons is to avoid consuming food which contains allergens. At first sight it seems simple, but the fact that allergic people react to small amounts of allergens and that most common causes of allergies (milk, eggs, wheat, nuts) are present in a large number of food products, makes avoiding allergens complicated and lasting.

In the goal of efficacy in protecting products and consumers from the presence of allergens, it is necessary to apply higher procedures, known as Good Manufacturing Practice (GMP), during the whole supply and production chain (origin of raw materials, factory and equipment design, hygiene in production processes, handling food, storing, transport of products, cleaning, personal hygiene). When the same equipment is used during production of multiple products, and only one can contain allergens, special measures have to be taken to prevent the presence of allergens and contamination of other products with key allergens.

2. Materials and Methods

This paper presents part of activities undertaken in one company, which deals with production and packaging various powdery materials, with the goal to prevent the presence of allergens in final products. During the analysis of risks caused by allergens, assessment of the risk regarding the presence of allergens in the ingredients themselves was done as well as the possibility of cross-contamination using the same process equipment for the production of food with and without allergens. Analysis was performed regarding 14 allergens which are known as the most common sources of intolerance, either as ingredients or as supplements in the food production process. Analysis was done regarding the following allergens:

1. Grains that contain gluten, which are: wheat, rye, barley, oats, spelt and durum wheat or their hybrids and products, except:
3. Results and Discussion

3.1 Managing allergens in production process

Food manufacturers are responsible for the safety of their products. This also refers to the presence of allergens in products [1, 22 - 30]. Three phases of allergy management strategy are being shown in this paper: identification, separation and labelling. In order to prevent residues in finished products, a comprehensive control plan has been made (Table 1). The plan includes allergen identification, ingredients control, packing, labelling, planning the order of manufacturing different products on the same lines, effective cleaning and staff training.

The first step was to identify key allergens. They are the most common cause of food allergies (gluten, eggs, milk, soy, peanuts, walnut and other kinds of stone fruit like hazelnut, almond, cashew, then shrimp, shellfish, celery, sesame, linpe, mustard, sulphur dioxide (Table 2). Raw materials and procedures during processing and storage were analysed in the second phase in order to determine products which are produced on the same plant lines and contain key allergens.

At all levels of food production, food processing, food storage and use, additional control was introduced in order to prevent cross-contamination with raw materials or residual allergens during production as well as to inform consumers on presence of allergens in traces if there is a slightest possibility for it. In order to confirm that their products do not contain allergens, companies have to make sure that none of the products contain ingredients which act like allergens and that none of the products cause slightest risk of cross-contamination during production or packing in plants where other products that contain allergens are being processed.

GMP starts with detailed analysis of raw materials and suppliers (Table 3). The attention is being paid to the estimate of presence of peanuts and walnuts which have been used as a raw material in other products processing. Supplier has to provide information on usage of raw materials which carry allergens in supplier’s plant (Table 3). Suppliers are obliged to inform the company about the allergens present even in very small amounts, for example the amounts that are sufficient for an ingredient to be a precursor of taste.

The company’s authorities must particularly assess the risk of cross-contamination of products which are packed on the same lines in the same facility. In all cases where there is a risk of cross-contamination, producers give information about it in a product label (Figure 1). Appropriate measures have been undertaken in the production facilities and storage rooms in order to ensure their traces do not contaminate other products and raw materials during transport of raw materials in the production facility. Raw materials containing...
Table 1. Plan for production of powdered products with the instruction for prevention of cross-contamination

| Supply of raw materials | When receiving raw materials from suppliers, the Allergen Statement which clearly shows which allergens are present in the raw materials or which allergens may be present in traces, must be submitted by suppliers.  
Allergen Statement must be in accordance with the Rulebook on the provision of food information to consumers (‘The Official Gazette of B&H’, no. 68/13) or EU regulation 1169/2011 on the provision of food information to consumers.  
Information on allergens must be stated on product labels for products for which supplier mentioned in the Allergen Statement that they contain allergens or that allergen presence is possible in traces.  
Products from recall are specifically labelled as raw materials for internal use only and are being kept separate from other raw materials. |
| --- | --- |
| Storage | Raw materials that contain allergens should be stored separately in the lower part of the warehouse.  
During production planning, always plan activities on the development of products from the “sweet program” separately from activities on the development of products from the “salty program.”  
During production planning, be sure to take into account the procedures for preventing crossing of the products that contain allergens with products that do not contain them and with products which do not have information on presence of allergens labelled.  
In the plant for production of powdered and granular products, products containing following allergens are being produced:  
o Celery (vegetable food supplements, soups),  
o Gluten (wheat semolina, wheat crumbs, white -kernelled wheat, soups)  
o Sesame (sesame),  
o Milk (whipped cream, ice-cream desert, hot white chocolate),  
o Soy (chocolate pudding, whipped cream chocolate, chocolate ice-cream dessert, stracciatella ice-cream dessert, Boni quick, classic Hot Chocolate, Hot Chocolate-flavoured hazelnut),  
o Nuts (hazelnut, almond).  
The nutrition facts table must include information on the content of allergens according to the legislation.  
To avoid cross-contamination, plan the production in such way to enable continued production of products containing the same allergen.  
After completion the production of products with allergens, perform washing of machines and equipment that have been in contact with the product according to the plan of plant hygiene.  
Moving to production of other product, which does not contain allergens or which will not be labelled with information on the possible presence of allergens, is done with the obligatory records of sequence of production.  
Exceptionally, when making ‘Vegetable Food Supplement, at the same time, in the same plant, yet on a different equipment, products from a ‘salty program’ can be produced (rice, wheat, popcorn, pepper, paprika, bay leaves, oregano, soda, citric acid preservative, potassium met-bisulphate, soup or baking powder.  
If, for some reason, dust is formed on machines where the product containing allergen is produced, making all other products should be discontinued, and machine shut down.  
Mixer is being washed upon completion of the product containing allergen, after the end of production of non-ferrous products, after completion of the production of products with distinctive flavour, and after production of baking powder.  
Mixer does not need to be washed if vanilla sugar or vanilla pudding were mixed in it and followed by any other product from the sweet program. Mixer should be air dusted.  
Mixer does not need to be washed if chocolate pudding was mixed in it and followed by any other chocolate product.  
Weekly plan for pudding production should predict that light puddings are produced at the beginning of the week, and dark puddings at the end of the week.  
Weekly plan for cream production should predict that light creams are produced at the beginning of the week, followed by dark creams and chocolate creams come at the end of the week. Plan should include that production of ‘coffee cream’ must be last.  
Product labelling | Product label of product containing allergens must clearly indicate the allergens. In case there is a risk from cross-contamination, product label must indicate there is a possibility of presence of allergens.  
Storage and transport | Products that contain allergens should be packed in sealed containers, stored in separate rooms and transported separately from products without allergens. |
<table>
<thead>
<tr>
<th>Product name</th>
<th>Question</th>
<th>Grains that contain gluten (i.e. wheat, rye, barley) and their products</th>
<th>Crustaceans and crustacean products</th>
<th>Fish and fish products</th>
<th>Eggs and egg products</th>
<th>Peanuts and peanut products</th>
<th>Soybean and soybean products</th>
<th>Milk and milk products (including lactose)</th>
<th>Nuts i.e. almond, hazel, nut, cashew nut, pistachio and their products</th>
<th>Celery and celery products</th>
<th>Lupin and lupin products</th>
<th>Mustard and mustard products</th>
<th>Sesame seeds and sesame seed products</th>
<th>Sulphur dioxide and sulphite with a conc. greater than 10 mg/kg or 10 mg/litre expressed as SO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable food supplement</td>
<td>Is the presence of the following allergens possible in ingredients or in product?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>DA</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Is the presence of the following allergens possible in other products made on the same line?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>ONE</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Is it necessary to state the presence of allergen?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Pudding powder with vanillin flavour</td>
<td>Is the presence of the following allergens possible in ingredients or in product?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Is the presence of the following allergens possible in other products made on the same line?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Is it necessary to state the presence of allergen?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Powdered sugar</td>
<td>Is the presence of the following allergens possible in ingredients or in product?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Is the presence of the following allergens possible in other products made on the same line?</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Is it necessary to state the presence of allergen?</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>
Table 3. Example of description of raw materials and the assessment of presence of allergens

<table>
<thead>
<tr>
<th>Presence or absence of allergens</th>
<th>From Recipe*</th>
<th>From internal cross-contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Peanuts/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fish/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gluten/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crustaceans/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lupine/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Milk (incl. lactose)/products of these</td>
<td>+</td>
<td>n. a.</td>
</tr>
<tr>
<td>Nuts/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Celery/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mustard/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sesame/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Soy protein/products of these</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sulfite (concentration &gt; = 10 mg/kg)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Molluscs/products of these</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend:
+ = present,
- = absent, ? may contain traces Based on EU legislation
* = allergen from recipe (04 Glucose syrup from wheat? No labelling acc. to 2011/1169/EC)

General remark:
- Production locations are allowed to use alternative methods as long as they are validated against the given international approved methods.
- Additional information regarding legal status, application and handling of the product will be supplied on request.

allergens must be transported in sealed containers with information that they should not be mixed with other ingredients. A convenient method for identifying compounds that contain allergens and their separation from other materials, which are used in companies, is to label packaging with different colours. High risk allergens (e.g. walnuts and raw materials which contain walnuts) are kept in locked storage room and are available only to authorised people.

Different products are being produced on the same lines. Work plan in a company strives to decrease the risk of transferring allergens from one product to another. After one product has been processed, detailed cleaning is performed (Table 4). Only after the efficiency of undertaken measures has been checked, other product can be processed. Products that contain allergens are processed at the end of the day, i.e. just before the detailed cleaning of machines and facility thus lowering the risk of transferring allergens.

The company uses fast methods to determine how successful cleaning was and sometimes samples are sent to the certified laboratory for quantitatively determination of the amount of allergens in products and for verification of the results (Table 5).

Special precautions are taken during the reception of the product form recall and their reprocessing. Such products are clearly labelled as raw materials for internal use only and precautions are taken when they are used as a raw material.

Additional problems in plants are powdered raw materials and powdered final products (powdered raw materials and products, dust and similar). Such substances can be airborne into other parts of the plant and in such way they can contaminate products with allergens [25]. Additional measures are taken in the plant to prevent transfer of allergens through clothes into other rooms.

Besides risks relating to products which contain allergens, there are risks relating to the staff being allergic to certain ingredients. In this case, it is necessary to prevent every contact of an individual person with allergens and substances which contain allergens. Visitors to a plant must be informed on risk and advised not to enter certain part of a facility where allergens can be present even in traces.

3.2 Confirmation of presence/absence of allergens

After the performed activities, persons in charge in the company make a decision if the final product contains/does not contain allergen and whether to inform consumers about it. In that way, it is possible for persons allergic to some ingredients not to use certain foods in their nourishment.

Figure 1. Example of allergen labelling (Food Allergens is bolded)
### Table 4. Plan of cleaning of machinery for production of powdery products

<table>
<thead>
<tr>
<th>Object being cleaned</th>
<th>Cleanser</th>
<th>Concentration</th>
<th>How?</th>
<th>How often?</th>
<th>Cleaning done by</th>
<th>Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large mixer; Mixer „Lödige“; Containers; Plasticware</td>
<td>Water, brush</td>
<td>/</td>
<td>Air dusting</td>
<td>When changing products / weekly-general cleaning service</td>
<td>Operator on preparation in the production of powdered products</td>
<td>Worker assigned by manager</td>
</tr>
<tr>
<td>Water, brush</td>
<td>Water</td>
<td>/</td>
<td>Wash using water and brush, remove drainage pipe of the big mixer and wash it with water and brush</td>
<td>After products containing allergens (milk powder, chocolate powder, cocoa with lecithin or celery) have been mixed/ When switching from dark products (chocolate pudding, whipped cream, chocolate, etc.) to the light ones (vanilla sugar, baking powder, cream foam)/ When switching from salty to sweet products</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Ilapak line</td>
<td>Divosan forte, 0,1% / Preparation of solution (1 g / 1 L of water)</td>
<td></td>
<td>Splash the solution on the surface of the mixer / container / plastic ware</td>
<td>Weekly-general cleaning service</td>
<td>Operator on the machine for packaging powdered products / Machine operator</td>
<td>Worker assigned by manager</td>
</tr>
<tr>
<td>/</td>
<td>/</td>
<td>/</td>
<td>Air dusting of the elevator pipe and basket</td>
<td>When changing products / weekly-general cleaning service</td>
<td>Operator on the machine for packaging powdered products / Machine operator</td>
<td>Worker assigned by manager</td>
</tr>
<tr>
<td>Water, brush</td>
<td>Water, Divosan forte, 0,1% / Preparation of solution (1 g / 1 L of water)</td>
<td></td>
<td>Disinfect spiral and basket splashing Divosan forte 0,1% on the surface</td>
<td>Weekly-general cleaning service</td>
<td>Operator on the machine for packaging powdered products / Machine operator</td>
<td>Worker assigned by manager</td>
</tr>
<tr>
<td>Wall tiles</td>
<td>Water, detergent, brush</td>
<td>Ready to use</td>
<td>Washing</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Windows</td>
<td>Water, detergent, brush</td>
<td>Ready to use</td>
<td>Washing</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Floor tiles</td>
<td>Water, brush</td>
<td>Ready to use</td>
<td>Cleaning</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Air condition and ventilation pipes</td>
<td>Water, brush, telescope</td>
<td>/</td>
<td>Wipe the pipes using wet brush which is screwed on the telescope</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Doors and platforms</td>
<td>Water, detergent, brush</td>
<td>Ready to use</td>
<td>Cleaning</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td>Records of general cleaning of the plant for the production of powdered products</td>
</tr>
<tr>
<td>Mixer sewer</td>
<td>Hypofoam in foam lance</td>
<td>According to the instruction manual for foam lance</td>
<td>Apply the cleanser into canal and drain pipe, leave it for 10-15 minutes and rinse with water</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
<td></td>
</tr>
<tr>
<td>/</td>
<td>/</td>
<td>/</td>
<td>0,1% / Preparation of solution (10 g / 10 L of water) / Hypofoam in foam lance</td>
<td>Pour the cleanser into canal and drain pipe</td>
<td>Weekly-general cleaning service</td>
<td>Worker assigned by manager</td>
</tr>
</tbody>
</table>
3.3 Labelling

According to current regulations, in labelling industrial and packaged products there has to be information about the list of ingredients. On this list, possible allergens have to be especially stressed [19, 20, 31, and 32]. In all cases where cross-contamination is possible, the manufacturer imprints the following text on the label “product can contain ...”

4. Conclusions

- Allergens in food are natural proteins which are resistant to heat, proteolytic enzymes and change of pH. Immune system of an individual can react to a small quantity of present allergens (quantities expressed in ppm). Different individuals show different sensitivity and they differently react to the presence of the same allergen. Avoiding contact with an allergen is the only way for a person with allergy to prevent a reaction.

- Decreasing risk to food allergens with which consumers come in contact with can be decreased: timely identification of food products which contain substances which cause allergic reactions, appropriate control in the process of food production and storage (GMP), using tools which can verify conducted control (regulations, labelling), as well as verification of efficacy of conducted prevention measures in the process of food production by using fast methods of detecting allergen residue in products.

5. References


