



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Undeclared allergens and gluten in protein substitutes/vegetarian meats, simulated meat/poultry products— April 1, 2022, to March 31, 2023

Food allergen – Targeted surveys



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substituts végétariens de viande et des produits de simili-viande/volaille

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Executive summary

Targeted surveys provide information on potential food hazards and enhance the Canadian Food Inspection Agency's (CFIA's) routine monitoring programs. These surveys provide evidence regarding the safety of the food supply, identify potential emerging hazards, and contribute new information and data to food categories where it may be limited or non-existent. We use them to focus surveillance on potential areas of higher risk. Surveys can also help identify trends and provide information about how industry complies with Canadian regulations.

Food allergies can affect people of all ages but are particularly common in children. Food allergens can represent a serious or life threatening health risk for allergic individuals. Additionally, although it is not considered an allergen, undeclared gluten may contribute to chronic health issues for those individuals with celiac disease or gluten sensitivity. Allergens and gluten can be found in food due to their presence in the raw ingredients or they can be accidentally introduced along the food production chain due to cross contamination. Regardless of the source of the allergens, industry must ensure that the food produced is safe for human consumption, either by complying with specific Canadian regulations where applicable or by keeping the levels as low as reasonably possible.

The main objective of this survey was to obtain additional information regarding the presence and levels of undeclared allergens and gluten in protein substitutes/vegetarian meats, and simulated meat/poultry products. Of the 297 samples tested, 16 samples were found to contain undeclared gluten and allergens such as almond, egg, sesame, soy and milk proteins beta-lactoglobulin (BLG) and casein.

Of the positive samples, 15 were forwarded to the CFIA's Office of Food Safety and Recall (OFSR) to determine if the levels found would pose a health concern to allergic individuals. The extent of the follow-up actions taken by the Agency is based on the level of the contamination and the resulting health concern as determined by a health risk assessment conducted by Health Canada. 7 products sampled in this survey were found to represent a health risk and were recalled.

What targeted surveys are

Targeted surveys are used by the CFIA to focus its surveillance activities on areas of higher health risk. The information gained from these surveys provides support for the allocation and prioritization of the Agency's activities to areas of greater concern. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying and characterizing new and emerging hazards, informing trend analysis, prompting and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. The Agency works with federal, provincial, territorial and municipal governments and provides regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

Why the survey was conducted

Approximately 7% of Canadians have self-reported as having at least 1 food allergy, but the actual number of medically confirmed food allergies is expected to be slightly lower¹. It is believed that the rate of food allergies is increasing, particularly among children. Food allergies are estimated to affect up to 5% of adults and up to 8% of children in developed countries². Food allergens are food proteins that can cause a reaction of the body's immune system, and can represent a serious or life threatening health risk for allergic individuals, or contribute to chronic health issues for those with pre-existing health conditions like celiac disease. Celiac disease is a chronic reaction where the body reacts to a component of gluten which can damage or destroy certain intestinal cells. Approximately 1% of the total population are affected with celiac disease³.

The priority food allergens are the 10 most common food allergens that are associated with severe allergic or allergy-like reactions in Canada. These allergens consist of peanuts, tree nuts, sesame, seafood (fish, shellfish and crustaceans), eggs, milk, soy, mustard, sulphites, and wheat⁴. Gluten, while not a true allergen, is a family of proteins found in certain grains like wheat, rye, barley, kamut, and spelt and is included in this list⁵. Gluten can cause digestive problems and other issues for people with certain health conditions such as celiac disease and gluten sensitivity. This makes proper identification and labeling of allergens in food by the manufacturer essential.

Undeclared allergens can be found in foods due to their presence in the raw ingredients or can be accidentally introduced along the food production chain through cross contamination. Regardless of the source of the allergens, industry must ensure that the food they produce is safe for human consumption. This can be achieved by complying with specific Canadian regulations where applicable, or by keeping the levels as low as reasonably possible.

The main objective of this survey was to obtain additional information regarding the presence and levels of undeclared allergens and gluten in protein substitutes/vegetarian meats, and simulated meat/poultry products.

All products were tested “as sold,” meaning that they were not prepared as per the manufacturer’s instructions or as they would typically be consumed.

What we sampled

All products were sampled between April 2022 and March 2023. Samples were collected from local and regional grocery stores located in 6 major cities across Canada. These cities represented 4 geographical areas:

- Atlantic (Halifax)
- Quebec (Montreal)
- Ontario (Toronto, Ottawa)
- West (Vancouver and Calgary).

The number of samples collected from these cities was in proportion to the relative population of the respective areas.

The following products were not included in the survey:

- Products with **all** of the following allergens in the list of ingredients – almond, hazelnut, peanut, sesame, soy/soybean, egg, milk, and wheat, barley, oats, rye, triticale, or gluten
- Products with a precautionary statement for all priority allergens
- Non pre-packaged products/bulk bin products
- Products with no list of ingredients
- Products past the best before date
- Products containing meat, fish or seafood

Table 1: Distribution of samples based on sample type and origin

Sample type	Domestic	Import	Unspecified ^a origin	Total
Fish/Seafood substitutes	16	44	14	74
Meat/Poultry substitutes	52	65	39	156
Ready-to-eat meals	20	27	20	67
Total	88	136	73	297

Table notes

^a Unspecified refers to those samples for which a country of origin could not be determined from the product label or available sample information.

How samples were analyzed and assessed

Samples were analyzed by an ISO/IEC 17025 accredited food testing laboratory under contract with the Government of Canada. The samples were tested as sold, meaning that the product was tested as-is and not as prepared according to package instructions.

In Canada, food allergens and gluten must be declared in the list of ingredients if they are present in the prepackaged product in order to comply with the requirements of the [Food and Drug Regulations Section B.01.010.1](#). A prepackaged product will be deemed non-compliant if any level of undeclared allergens and gluten is detected.

Health Canada considers that gluten-free foods, prepared under good manufacturing practices, which contain levels of gluten not exceeding 20 parts per million (ppm) (due to cross contamination) meet the intent of the [Food and Drug Regulations Section B.24.018](#) for a gluten-free claim⁵.

Results of the survey

Nearly 95% of the protein substitutes/vegetarian meats and simulated meat/poultry products tested in this survey contained no detectable levels of allergens or gluten. The results for 16 positive samples are shown in Table 2 below.

Table 2: Levels of undeclared allergens and gluten in protein substitutes/vegetarian meats, simulated meat/poultry products in parts-per-million (ppm)

Sample type	Sample description	BLG ^b	Casein ^c	Almond	Egg	Gluten	Sesame	Soy
Fish/Seafood substitutes	Plant based fishless bites jackfruit bites							1.13
Fish/Seafood substitutes	Plant based fishless bites							1.51
Fish/Seafood substitutes	Plant based crabless cakes				2.73			
Meat/Poultry substitutes	Artisan vegan burgers quinoa & chickpea with fresh dill and lemon juice					57		
Meat/Poultry substitutes	Plant based burgers							7.06
Meat/Poultry substitutes	Plant based hot dogs				7.32			
Meat/Poultry substitutes	Plant based incredible meatballs					7.9		
Meat/Poultry substitutes	Veg-O-Mix ham flavour				62			

Meat/Poultry substitutes	Organic veggie cevapcici			89.3				
Meat/Poultry substitutes	Lentil & walnut with fresh herbs and shiitake mushrooms plant based burgers					22		
Meat/Poultry substitutes	Plant based schnitzels	2.0	13.2					
Meat/Poultry substitutes	Veg up mixed vegetable kababs						2.09	
Meat/Poultry substitutes	Vegetarian ham					22000		
Ready-to-eat meals	Plant based meatless sausage breakfast sandwich	0.35	12.1					
Ready-to-eat meals	Plant based breakfast sandwich meatless sausage		4.51					
Ready-to-eat meals	Plant based coconut curry cauli	0.58	26.4					

Table notes

^bBLG stands for β -Lactoglobulin which is the major whey protein of milk, therefore BLG is an indicator of the presence of milk in the product.

^cCasein is another major protein found in milk and is also an indicator of the presence of milk in the product.

What the survey results mean

Of the 297 samples tested in this survey, almost 95% did not contain any detectable levels of allergens or gluten, while 16 samples were found to contain at least 1 undeclared allergen, namely BLG, casein, almond, sesame, egg, gluten and soy. The best currently available scientific evidence indicates that levels of gluten below 20 ppm in gluten-free foods would be protective of the health of the vast majority of people with celiac disease⁵, so one gluten positive was compliant. Therefore, 15 positive samples were forwarded to the CFIA's OFSR for follow-up. 7 products sampled in this survey were found to represent a health risk and were recalled.

The extent of the follow-up actions taken by the CFIA is based on the level of contamination and the resulting health concern as determined by a health risk assessment conducted by Health Canada. Appropriate follow-up actions include additional sample testing, facility inspection and product recall. The health risk assessment is based on exposure to the allergens and gluten through consumption. The exposure is calculated by using the typical serving sizes for each food. Assessment based on serving size means not all detectable levels of undeclared allergens and gluten in food will cause a reaction in an allergic individual.

Milk

Both undeclared BLG and casein were detected in 2 ready-to-eat meal products and 1 meat/poultry substitute product, while casein only was detected in 1 ready-to-eat meal product. BLG (a whey protein) and casein are major milk proteins. Casein derivatives such as sodium caseinate are used as emulsifiers and thickening agents in processed foods⁶. Whey proteins also have excellent emulsifying and foaming properties, so they are widely used in producing chocolate, desserts, yogurts, etc^{7,8,9}. The low levels of BLG and casein found in this survey could also be introduced into the product due to cross contamination on the production line¹⁰. All of these products were assessed as being of risk to consumers, and were recalled^{11,12,13,14}.

Almond

1 meat/poultry substitute product in this survey tested positive for undeclared almond. The low level of almond in the product could be a result of cross contact of mislabeled or contaminated raw ingredient¹⁵. Inadequate cleaning of shared processing and/or packaging equipment between each run could introduce low levels of allergens in products¹⁶. This product was assessed as being of risk to consumers and was recalled¹⁷.

Gluten

4 meat/poultry substitute products were found to contain undeclared gluten. Lower detected levels of undeclared gluten have been known to be present due to cross-contamination as a result of manufacturing practices¹⁸. 1 of these products was assessed as being a risk to consumers and was recalled¹⁹.

Soy

Undeclared soy was found in 2 fish/seafood substitute products and 1 meat/poultry substitute product. The levels detected were likely due to cross contamination or cross contact in the manufacturing process¹⁶. This could result in the presence of a small amount of allergen in the final product. The levels found were low and deemed not to pose a risk to consumers, so no product recalls were needed.

Egg

2 meat/poultry substitute products and 1 fish/seafood substitute product in this survey tested positive for undeclared egg. Low levels of egg in the product could be a result of cross contact

of mislabeled or contaminated raw ingredient¹⁵. Inadequate cleaning of shared processing and/or packaging equipment between each run could introduce low level allergens in products¹⁶. 1 meat/poultry substitute product was assessed as being a health risk to consumers and was recalled²⁰.

Sesame

1 meat/poultry substitute product tested positive for undeclared sesame. Cross-contamination from processing and handling on the shared production line may be the reason for the low level of sesame in the tested products¹⁶. The level found was deemed not to pose a risk to consumers, so a product recall was not needed.

Summary

4 meat/poultry substitute products and 3 ready-to-eat meal products resulted in product recalls, while all other positive allergen findings in this survey were determined not to pose a risk to consumers.

The current survey results (5.4% positive rate) are similar to those found in a similar survey conducted in 2021 by CFIA (4.0% positive rate) and 2020 by CFIA (4.1% positive rate). In the 2021 survey, 249 samples were tested and 10 of the samples were found to contain at least 1 undeclared allergen, including beta-lactoglobulin (BLG), casein, egg, gluten, sesame and soy. In the 2020 survey, 290 samples were tested and 12 of the samples were found to contain at least 1 undeclared allergen, including beta-lactoglobulin (BLG), casein, egg, peanut, sesame and soy.

This survey generated additional information regarding the presence and levels of undeclared allergens and gluten in protein substitutes/vegetarian meats, simulated meat/poultry products collected from 6 cities across Canada. Information gathered in this survey, in conjunction with other data including the Canadian Total Diet Study and Statistics Canada's Canadian Health Measures Survey food consumption data, are critical in assessing the health risk that our food supply poses to Canadian consumers. The results of the CFIA's surveillance activities are also used to inform the Canadian public and stakeholders by raising consumer awareness and help build public confidence in their food supply by removing non-compliant products.

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