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Rapid Alert System for Food and Feed reports as a source of information on food hazards

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Abstract

Introduction

Food safety is a major challenge worldwide and an important factor frequently taken into account by consumers when making food choices. Over the years, a number of unfavorable phenomena related to food adulteration and an increase in its contamination have been observed, which in turn translates into a lower level of food quality and safety and a decrease in consumer confidence.

Aim

The aim of this study was to analyze the Rapid Alert System for Food and Feed (RASFF) reports from 2019-2021 in terms of types of hazards in food.

Materials and methods

The research material consisted of the annual reports of the RASFF for the years 2019-2021.

Results

The submissions to the RASFF per product type system were dominated by those related to food. In 2020 and 2021, the most notifications concerned fruits and vegetables, dietetic food,

food supplements, and fortified foods. In the group of 10 products causing the most frequent notifications, there are products of animal origin: meat and meat products (other than poultry), fish and fish products, milk and milk products, poultry meat and poultry meat products. The main threats associated with food in the last three years were contamination with *Salmonella* in poultry meat and poultry meat products, herbs and spices, and nuts, nut products and seeds; aflatoxins, especially in nuts, nut products and seeds; and pesticide residues in fruit and vegetables.

Conclusion

The observed increase in the number of notifications in the RASFF reports in 2019-2021 shows that all EU Member States are involved in monitoring food safety risks. The functioning of the RASFF system enables immediate action to be taken in the EU countries in relation to the risk, and allows for quick information transfer and elimination of products that are hazardous to the health of the consumer.

Keywords: Rapid Alert System for Food and Feed, RASFF reports, food safety, food contamination, food security

Raporty Systemu Wczesnego Ostrzegania o Niebezpiecznej Żywności i Paszach jako źródło informacji o zagrożeniach występujących w żywności

Streszczenie

Wprowadzenie

Bezpieczeństwo żywności stanowi wyzwanie i jest ważnym czynnikiem, który konsumenci na całym świecie biorą pod uwagę przy dokonywaniu wyborów żywieniowych. W ciągu ostatnich lat obserwuje się szereg niekorzystnych zjawisk związanych z fałszowaniem żywności oraz wzrostem jej skażeń, co w konsekwencji przekłada się na obniżenie poziomu jakości i bezpieczeństwa żywności oraz spadku zaufania konsumentów.

Cel

Celem pracy była analiza raportów RASFF z lat 2019-2021 pod względem rodzajów zagrożeń występujących w żywności.

Materiał i metody

Materiał badawczy stanowiły roczne raporty Systemu Wczesnego Ostrzegania o Niebezpiecznej Żywności i Paszach (ang. Rapid Alert System for Food and Feed, w skrócie RASFF) z lat 2019 – 2021.

Wyniki

W zgłoszeniach do systemu RASFF w podziale per product type dominowały te dotyczące żywności. W latach 2020 i 2021 najwięcej zgłoszeń dotyczyło owoców i warzyw, żywności dietetycznej, suplementów diety oraz żywności wzbogacanej. W grupie 10 produktów powodujących najczęściej zgłoszenia znajdują się produkty pochodzenia zwierzęcego: mięso i przetwory mięsne (inne niż drób), ryby i przetwory rybne, mleko i przetwory mleczne, mięso drobiowe i przetwory z mięsa drobiowego. Głównymi zagrożeniami związanymi z żywnością w ostatnich trzech latach były zakażenia *Salmonella* w mięsie drobiowym i produktach drobiowych, ziołach i przyprawach oraz orzechach, produktach orzechowych i nasionach; aflatoksyny, zwłaszcza w orzechach, produktach z orzechów i nasionach; oraz pozostałości pestycydów w owocach i warzywach.

Wnioski

Obserwowany wzrost liczby powiadomień w raportach RASFF w latach 2019-2021 wykazuje, że wszystkie państwa członkowskie UE są zaangażowane w monitorowanie zagrożeń związanych z bezpieczeństwem żywności. Funkcjonowanie systemu RASFF umożliwia podjęcie w państwach UE natychmiastowych działań w stosunku do zaistniałego zagrożenia i pozwala na szybkie przekazanie informacji oraz wyeliminowanie produktów niebezpiecznych dla zdrowia konsumenta.

Słowa kluczowe: System Wczesnego Ostrzegania o Niebezpiecznej Żywności i Paszach, raporty RASFF, bezpieczeństwo żywności, zanieczyszczenia żywności, bezpieczeństwo żywieniowe

Introduction

Ensuring the safety of food production and its distribution are key factors determining the development of the modern food sector of agri-food products. The increase in consumer awareness determines the nutritional behavior that is directly related to the awareness of food quality and its safety. When choosing agri-food products, the consumer pays attention to the authenticity of the product and its high value, which affects the nutritional and biological value related to the use of nutrients supplied with the diet (Frąś et al., 2016). In order for agri-food products to meet consumer expectations in terms of high quality and safety, it is necessary to monitor the entire product life cycle, from raw materials through all stages of the production process, packaging and storage, to logistics and market turnover (Frąś et al., 2016). The Codex Alimentarius defines food safety as ensuring that food will not cause harm to the health of the consumer when prepared and consumed in accordance with its intended use (Kołożyn-Krajewska, 2008). Polish legislation on food and nutrition safety defines food safety as "all conditions that must be met, in particular: additives and flavorings used, levels of contaminants, pesticide residues, food irradiation conditions, organoleptic characteristics and actions that must be taken at all stages of food production or marketing to ensure human health and life (Dz.U.2020.0.2021). Food safety in the European Union is a priority, concerns all citizens and is closely linked to trade policy. This policy is reflected in legislative and institutional activities aimed at improving food safety (Żakowska- Biemans, 2011). Article 5 of Regulation (EC) No. 178/2002 (General Food Law) states that the aim is "to guarantee a high level of protection of human life and health". The European Union (EU) Rapid Alert System for Food and Feed (RASFF) was launched in 1979 and its legal basis is Regulation 178/2002. It is a tool for the Member States of the European Union to exchange information on hazards in food or feed entering the EU from a third country or from the European market. The members of the EU RASFF network are EU Member States, European Commission services, the European Food Safety Authority (EFSA), European Economic Area countries, EEA (Norway, Liechtenstein, Iceland) and Switzerland (Regulation (EC) No 178/2002). The Rapid Alert System for Food and Feed (RASFF), by which the competent authorities in each EU Member State provide notifications of the withdrawal from the market of unsafe or illegal products, makes an important contribution to food safety control in the European Union (Kowalska and Manning, 2021). According to Papapanagiotou (2021) and Osiński and Kwiatek (2012), the European Commission publishes an online database with searchable RASFF notifications on the RASFF portal. There are four types of notifications in the RASFF relating to the internal market of the Member States. The first one is an alert notification, which requires immediate action in the event of identifying any risk factors important from the point of view of product safety. The second type is an information notification which does not require immediate action as the risk factors in question carry a less serious risk, e.g. the food is not located in a Member State. The third type is a border rejection. In this case, the subject of consideration is a food or feed product checked at the EU border and not admitted to trading. Each of these notifications, due to the time, sequence and type of information, may be the original notification when it is submitted for the first time in relation to a specific case. This occurs when additional information obtained in the course of an investigation is given, which may bring new information of interest to the competent authorities and inspections. According to Leśkiewicz (2012), the issues of food safety and food security enjoy great interest in the literature on agricultural law and in the field of agricultural economics, both domestic and foreign, and the concepts of food safety and food safety can be analyzed in

various aspects. Despite attempts to strengthen the EU's food safety and early-warning system, accidents continue to occur that may have negative effects on the health of consumers.

Study aim

The aim of the study was to analyze the RASFF reports in terms of the most common hazards in food in 2019-2021.

Materials and methods

The research material was the RASFF reports from 2019-2021. All data used for the analysis were downloaded from the website of the European Commission (https://food.ec.europa.eu). The study analyzes the frequency of occurrence of threats by classifying notifications by product category, type of notification and country of origin.

Results

The submissions to the RASFF per product type system were dominated by those related to food. Additionally, in 2021 a rapid increase in notifications for food, feed and food contact material can be observed. For food, an increase was observed from 1505 in 2109 to 4102 in 2021, and for food contact material from 55 in 2020 to 269 in 2021 (Figure 1).

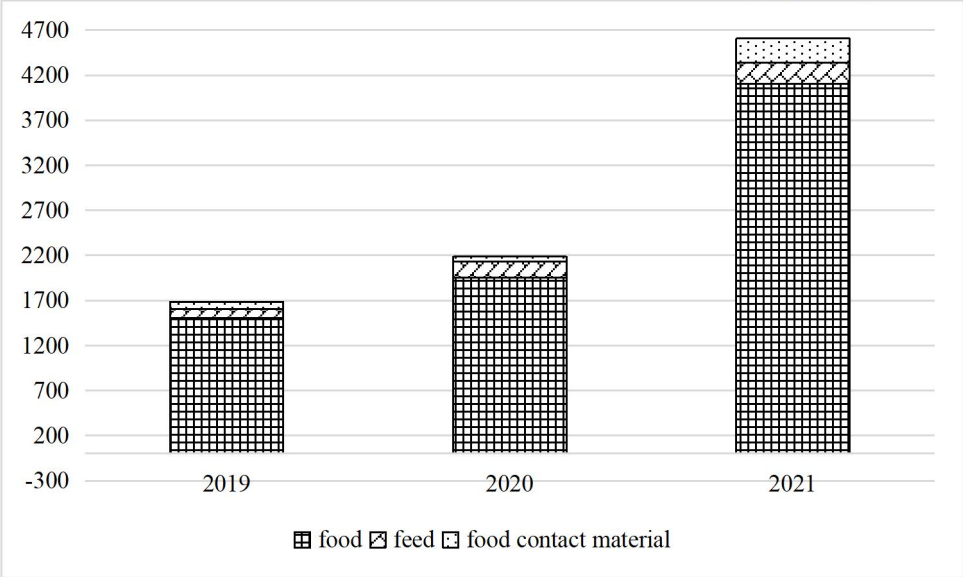

Figure 1. Notification per product type submitted in the RASFF between 2019 and 2022

In the last three years, almost a third of the original notifications were alerts, from 1173 (2019) to 1455 (2021), and border rejections, 1499 (2019) and 1457 (2021). There were fewer than 1056 border rejections in 2020, which may have been due to trade restrictions related to the COVID-19 pandemic (Figure 2). In the structure of notifications submitted to the RASFF system, it can also be observed that in 2021 the number of most types of notifications increased (Figure 2), for example, notifications from 3862 in 2020 to 4607 in 2021, information for attention from 791 (2020) to 1004 (2021), and information for follow-up from 546 (2019) to 672 (2021) (Figure 2).

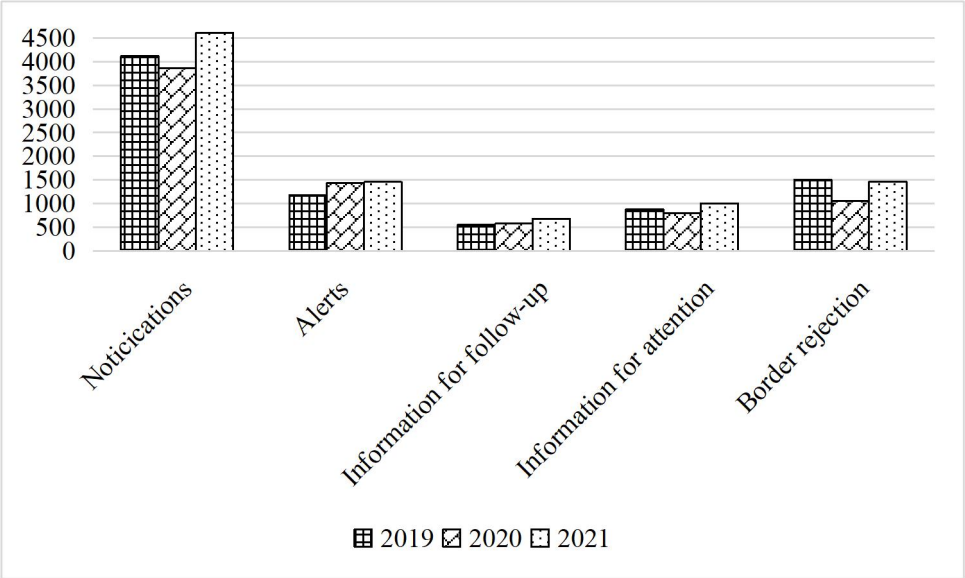

Figure 2. RASFF notifications in 2019-2021

In the last three years, virtually the same products have been subject to notifications. In 2020 and 2021, the most concerned fruits and vegetables, 362 and 335 (compared to 174 in 2019), and dietetic food, food supplements, and fortified foods, 294 and 224, respectively (compared to 187 in 2019) (Figure 3). In the group of 10 products causing the most frequent notifications, there are products of animal origin: meat and meat products (other than poultry), fish and fish products, milk and milk products, poultry meat and poultry meat products (Figure 3).

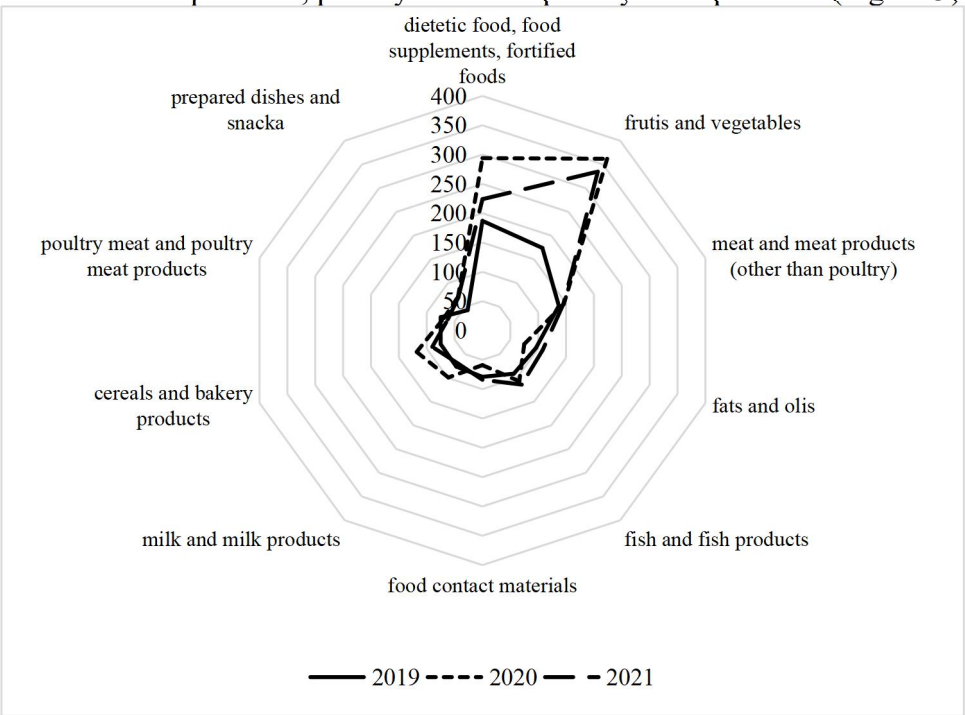

Figure 3. Notifications per product category

The countries that most frequently reported to the RASFF system in 2019-2021 include the Netherlands, Germany, France, Italy Poland, and Bulgaria. The main threats in food in the last three years were contamination with *Salmonella* in poultry meat and poultry meat products, herbs and spices and nuts, nut products and seeds; aflatoxins, especially in nuts, nut products and seeds; and pesticide residues in fruit and vegetables (Table 1).

Table 1 Top notifications by hazard category

Hazard category	Product category	Numer of notifications		
		2019	2020	2021
Salmonella	poultry meat and poultry meat products	189	273	263
Salmonella	nuts, nut products and seeds	99	nd	nd
Salmonella	herbs and spices	67	61	116
Aflatoxins	nuts, nut products and seeds	198	88	164
Aflatoxins	fruits and vegetables	49	58	67
Pesticide residues	fruits and vegetables	nd	190	359

The sharp increase in pesticide residues in fruits and vegetables from 190 in 2020 to 359 in 2021 is perturbing. The top 10 most frequent notifications by country of origin in 2019-2021 concerned *Salmonella* contamination in poultry meat and poultry meat products from Poland, nuts, nut products and seeds from Sudan, and herbs and spices from Brazil. Aflatoxins in nuts, nut products and seeds appeared in products from Argentina, Egypt, Iran, Turkey and the United States. Aflatoxins in fruit and vegetables were found in products from Turkey. Pesticide residues in fruit and vegetables were also detected in Turkish products. Among the microbiological pollutants, pathogenic microorganisms, mainly *Salmonella* spp., dominated. In 2021, a rapid increase in *Listeria monocytogenes* infections can be observed, which is particularly dangerous and even lethal for persons with a weakened immune system. In 2019, there were 16 notifications and in 2021 as many as 138 (Table 2) (EC 2020; EC 2021; EC 2022).

Table 2 Main food pathogens

Pathogenic type	Numer of notifications		
	2019	2020	2021
Salmonella	371	273	641
Listeria monocytogenes	16	129	138
Escherichia coli	32	30	49
Norovirus	nd	30	16

Discussion

Ensuring food safety in such a large and important market as that of the EU requires trust and close cooperation between the EU institutions and the authorities of individual Member States. The RASFF is a good example of this cooperation, enabling the exchange of information on unsafe food products from EU producers as well as on imported products, which in turn can help improve food quality. To effectively detect threats to food safety, European countries have developed the RASFF. Bánáti (2011) points out that the RASFF is a useful tool, but it cannot prevent contaminated food from entering the food chain. Hargin and Shears (2013) believe that the RASFF can help identify potential problems before they become commonplace. This system provides reliable information on the health risks associated with imported food, allowing for a quick response when incidents are detected. It offers a portal to an interactive online database storing all food and feed notifications reported on a daily basis. It is therefore a powerful tool for the exchange of information between European countries to track threats that may affect the food chain and threaten public health (Banach et al., 2016; Pigłowski, 2020; Postolache et al., 2020). In accordance with the principles of the RASFF, which is in force in Poland, in the event that the permissible content of a substance harmful to

health is exceeded in a food, the risk for the consumer is assessed and there is an obligation to inform the European Commission about the measures taken to prevent the threat and the reasons for the decision made (Sawilska-Rautenstrauch et al., 2011). When analyzing RASFF reports according to their type, it should be noted that the highest percentage of reports concerns food (Figure 1). According to Muss and Lesiow (2018) , from the moment of Poland's joining the RASFF system (May 2004) until mid-2018, the total number of original notifications sent under this system amounted to 44,969, with 39,770 alerts related to food, which constituted 88% of all notifications reported to the RASFF. With regard to animal feed, 3,075 alerts were recorded, which constituted 7%. On the other hand, 2,124 notifications concerned materials intended for contact with food, which constituted 5% of the total number of notifications. There has been a clear upward trend of the number of food notifications over the years. In addition, in 2021, a rapid increase in notifications for food, feed and food contact material can be observed. For food, an increase was observed from 1505 in 2109 to 4102 in 2021, and for food contact material from 55 in 2020 to 269 in 2021 (Figures 1 and 2). The plant product category represents the largest share of notifications in the three years covered by the survey (Figure 3). In 2020 and 2021 fruits and vegetables were the subject of 9.4 and 7.3%, respectively, of all RASFF notifications (3862 and 4607 respectively) (Figure 3). The second most common type of notification was dietetic food, food supplements, and fortified foods, with 187, 294 and 224 notifications in 2021, respectively. Czepielewska et al. (2018) also drew attention to the significantly growing number of reports regarding illegal composition of dietetic food, food supplements, and fortified foods in the years 2003-2016. Diet supplements are a special problem in Poland. According to the data of the European Commission, in 1997-2005 the Polish supplement market grew by 219%, and it was the largest increase among all European Union countries. This market is growing at a rate of approximately 8%. annually. According to the Supreme Audit Office, the market of dietary supplements in Poland should be assessed as an area of high health risk, underdiagnosed and supervised by state services responsible for food safety. Laboratory studies of dietary supplements commissioned by the Supreme Audit Office in 2017-2020 have shown that many supplements do not have the characteristics declared by the manufacturers, and there are also some that are simply harmful to health. On sale, including online, but also in stores and pharmacies, in addition to reliable preparations, there were adulterated dietary supplements containing, for example, pathogenic bacteria, substances prohibited from the psychoactive list, or stimulants structurally similar to amphetamines (NIK, 2022). The third most important group of products consisted of food of animal origin, with the most reports concerning poultry meat, which reflects the constant growth for this food group over the last decade, as confirmed by Konoiuk and Karwowska (2017) as well as Pigłowski (2020).

According to the literature, although the number of notifications by European countries varies considerably, five RASFF members have been listed several times as the most active: Germany, the Netherlands, France, Italy and the United Kingdom (Giorgi and Lindner, 2009; Konoiuk and Karwowska, 2017; Petośniei et al., 2010; Taylor et al., 2013, Kuchheuser and Birringer 2022). The intensive notification activity of these countries may result from both their high level of imports and the efforts of their national food surveillance systems, which are crucial to ensure the effective identification of potential threats related to imported food (Lüth et al., 2019).

Pigłowski (2020) highlights the fact that the increase in the number of notifications has been observed since 2002/2003. The analysis shows that the threats are becoming more and more diverse. According to the Commission, the 2010-2017 reports mainly concerned aflatoxins in nuts and seeds from China, Iran, Turkey and the United States. Aflatoxins have also been frequently reported in fruit and vegetables from Turkey and in herbs and spices from India. *Salmonella* has been reported in fruit and vegetables from Bangladesh and India, as well as in

poultry from Brazil and Poland. Therefore, in recent years the situation has not changed because the main safety risk is still the presence of aflatoxin and *Salmonella* in them (Tables 1 and 2). Similar hazards as notified in the RASFF were also listed in the report of the Reportable Food Registry (RFR) for 2009-2014. *Salmonella*, *Listeria monocytogenes*, and undeclared allergens were identified as the most frequently reported food hazards (Food and Drug Administration, 2016). According to the International Food Safety Authorities Network (INFOSAN) in 2011 and 2017, the main biological hazards were *Salmonella enterica* spp., *Clostridium* spp., *Escherichia coli*, *and Listeria monocytogenes*, and chemical hazards were heavy metals, aflatoxins, and methanol (Food and Agriculture of Organization of the United Nations, and World Health Organization, 2016; World Health Organization, and Food and Agriculture Organization of the United Nations, 2018). Pesticide residues in food represent one of the main food hazards, accounting for almost 10% of notifications reported in the European RASFF since 2002 (EC, 2021). The almost twofold increase in pesticide residues in fruit and vegetables in 2021, compared to 2020 (Table 1), is worrying. This problem was highlighted by Kuchheuser and Birringer (2022) in their analysis of notifications in the RASFF from 2002 to 2020 concerning pesticide residues in food in the European Union. They stated that in the analyzed period, a total of 5211 notifications were made, of which 15.8% were alarm notifications, 36.5% were information notifications and 47.8% were border rejections. Notifications on pesticide residues in food submitted to the RASFF between 2002 and 2020, which mainly concerned vegetables (53.8%) and fruits and tree nuts (24.2%), reported residues of 251 individual authorized and unauthorized substances with multiple residues. Within the category of vegetables, notifications on pesticide residues in food most often concerned fruiting vegetables, legume vegetables, herbs and edible flowers. Within the category of fruits and tree nuts, notifications on pesticide residues in food most often concerned berries and small fruits, miscellaneous fruits and citrus fruits. Among the notifying countries, the highest numbers of notifications were reported by Bulgaria, Germany, the Netherlands, the United Kingdom and Italy.

Conclusions

The observed increase in the number of notifications in the RASFF reports in 2019-2021 shows that all EU Member States are involved in monitoring food safety risks. The functioning of the RASFF system enables immediate action to be taken in the EU countries in relation to the risk, and allows for quick information transfer and elimination of products that are hazardous to the health of the consumer. The RASFF system is now an important element of the sanitary and epidemiological surveillance and health protection policy of the entire European Union. The growing number of food and feed risks, as reflected in the increasing number of notifications, indicates the need to increase accountability and strengthen cooperation between Member States. It is also necessary to conduct research on new tests that will make it possible to intensify and expand controls on agri-food products, as well as to regularly adapt EU legislation to new emerging threats.

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