

# Risk management and risk communication of an illegal use of sulphites in meat preparations

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## ABSTRACT

This paper presents a case study on the management of a food fraud associated with health risks: the illegal use of sulphites in meat preparations and minced meat in Slovenia in 2019. The purpose is to highlight the shortcomings of existing systems for ensuring food safety in case of food frauds and highlight challenges for improvements.

Sulphites are food additives but also have significant allergenic potential, hence they may cause serious reactions in sensitized consumers. Labelling of foods treated with sulphites is mandatory, and their use in meat and meat preparations in Europe is not allowed. However, certain food business operators may intentionally add sulphites into meat preparations to improve the sensory properties; besides being a food fraud, this exposes unaware consumers to health risks.

The case started with the notification of an allergic-like reaction by a consumer following the consumption of a meat product. While the public authorities reacted by intensifying controls on markets and retailers, the analysis of risk management and risk communication aspects showed a number of shortcomings: slow response time; lack of recall of sulphite-treated meat products and of an in-depth risk assessment.

The evaluation of this case study identified violations of food law regulations and consumer protection legislation. Effective risk management requires an interdisciplinary approach, integrating timely and targeted official control and risk communication throughout the food chain to protect consumers from unfair practices. Consistent, effective, and transparent communication among all actors who share responsibility in ensuring food safety is necessary to achieve improvements.

This serious case of food fraud with actual risks to consumer health provided an opportunity for lessons to be learnt regarding managing health hazards from intervention to prevention.

**Keywords:** risk management, risk communication, food additives, sulphites, food fraud, consumer protection

## Original scientific article

Received: 24. 11. 2023

Accepted: 21. 12. 2023

Published: 31. 12. 2023

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## INTRODUCTION

Food additives are intentionally added to food for a technological purpose in the processing and preparation of food products [1]. The use of certain additives is authorized in a certain quantity and only for one or more certain food categories – considering food intake, characteristics of foodstuffs and scientific knowledge, to ensure that use is safe also for a consumer with a high intake of the food(s) for which the additive is intended. When scientific evidence does not support safe use, then using certain additives in given food categories is not allowed [2]. Food additives enable food safety and quality to be preserved [3] and their use is motivated by the need for longer shelf life and increased production of high quality and safe food at an affordable price [4]. While food additives are assessed by EFSA and strictly regulated in the EU, the use of additives is often perceived by a consumer as “non-natural” in foods and potentially hazardous [5], [6], [7].

Sulphites are allergens and may cause symptoms of allergic reaction and intolerance in sensitized individuals, such as asthmatic reactions and bronchospasms, occasionally severe hives, flushing, bradycardia and gastrointestinal symptoms [9], [10], [11].

The recent conclusion by EFSA, supported by reports of sensitivity/intolerance reactions in humans, confirms that the use of sulphites is a potential safety concern [14].

In accordance with Regulation (EC) No 1333/2008, the use of sulphites (E220-228) in meat preparations, minced meat and fresh meat production is not permitted [1].

Usually, sulphites are added to many foods and beverages (fish, potatoes, wine, dried fruits, etc.) to prevent oxidation and bacterial growth, thus achieving longer shelf life. In Europe sulphur dioxide (SO<sub>2</sub>) and sulphites in foods and beverages at concentrations of more than 10 mg kg<sup>-1</sup> or 10 mg L<sup>-1</sup> expressed as SO<sub>2</sub>equivalents are subject to mandatory labelling [8]. Their incorrect use may entail health risks. Sulphites are allergens and may cause symptoms of allergic reaction and intolerance in sensitized individuals, such as asthmatic reactions and bronchospasms, occasionally severe hives, flushing, bradycardia and gastrointestinal symptoms [9], [10], [11]. According to [12], serious adverse reactions occur in 3 to 10% of the asthmatic population exposed to these food additives and include dermal, gastrointestinal, and respiratory symptoms. Bronchoconstriction is the most common adverse reaction and can lead to an asthma attack [9]. In addition, other serious symptoms may include urticaria, hypotension, angioedema, and anaphylactic other reactions [9], [13].

In 2022 EFSA carried out a re-assessment of the additives in the sulphur dioxide-sulphite group and concluded that, due to significant gaps in the toxicological data set, the previous temporary acceptable daily intake (ADI) (0.7 mg SO<sub>2</sub>/kg body weight/day) has to be withdrawn. EFSA derived a reference point of 38 mg SO<sub>2</sub>/kg body weight/day, based on neurobehavioral endpoints in rats, and a margin of exposure of 80 for safety assessment: the exposure scenarios raise safety concerns especially for high consumers of sulphite-added foods. EFSA also re-stated the need for better data on the origin, mechanisms, and dose-response of sulphite-related human hypersensitivity, as these are definitely relevant for a more robust assessment. The recent conclusion by EFSA, supported by reports of sensitivity/intolerance reactions in humans, confirms that the use of sulphites is a potential safety concern [14].

Food legislation requires mandatory labelling of allergens [8] with the aim of ensuring consumers' rights to safety, to be informed, and to make appropriate choices [15], [8]. In accordance with Regulation (EC) No 1333/2008, the use of sulphites (E220-228) in meat preparations, minced meat and fresh meat production is not permitted [1]. Their unlawful use gives the product a more attractive appearance, thus “masking” insufficient freshness [16], [17].

Although sulphites as allergens are subject to mandatory labelling [8], scientific articles report on unauthorized use of sulphites in EU Member States including Slovenia [18], [16], [19], [20], [17], [21], [22].

Food frauds occur when a Food Business Operator (FBO) intentionally deceives consumers about the quality and/or content of the food to gain an, usually economic, advantage for itself. Food frauds cover a broad range of cases including intentional substitution, addition, tampering or misrepresentation of food, food ingredients or food packaging, labelling, product information or false or misleading statements made about a product for economic gain; these unfair practices, may adversely affect the nutritional quality and/or safety of food, hence, consumer health [23], [24].

The consumer community is vulnerable to food frauds, also because of insufficient awareness about the increasingly complex nature of industrial food processing for number of reasons. Food science, or even the basis of food hygiene and nutrition, are generally not taught sufficiently in schools. On the other hand, consumers have no direct means for the verification of their expectations and have to rely completely on the food legislators and responsible authorities - enforcement agencies [25]. Studies show that the consumers are most worried about food and drugs adulteration, swindles and food contamination [26], [7], [5]. The perception of risk by average consumers may be greatly different from the perception of experts, as it is based on an ensemble of a range of beliefs, intuition, attitudes, judgments, feelings, opinions and culture, all of which differ widely among the population [27], [28], [29], [30]. The expert perception of risk is based on evidence, subject to the challenge of new research data and may include a risk-benefit approach [31]. Far from dismissing as irrelevant consumer perception, these considerations highlight the role of evidence-based risk communication and awareness raising in the consumer community as an important support to risk management.

Different hazards as well as different levels of risk require special consideration and specific ways of risk management and communication [32], [33] to build trust in and support to the agri-food safety system. Risk management strategies may use regulatory, advisory, and/or technological approaches, and take into account factors such as the size of the exposed population, required and available resources, costs of implementation, and the degree of scientific uncertainty of the risk assessment [34]. Food fraud as intentional act requires different approach as food safety issues that occur unintentionally.

This paper presents an important alert for the illegal use of sulphites in meat preparations and minced meat in Slovenia. The aim of the case study is to highlight the shortcomings of existing systems for ensuring food safety in case of food frauds and highlight challenges for improvements.

## METHODOLOGY

### Collecting information

The Minister of Agriculture, Forestry and Food has ordered a Decision on appointing a Committee for internal audit of official control in the case of additives in meat preparations and informing consumers (Committee). Members of Committee were state employees of Ministry from different areas of expertise (veterinary medicine, food technology, law and management).

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After checking and evaluating all documentation for each case, Committee performed interviews with responsible inspectors to clarify all possible gaps and uncertainties with the aim of verifying official control procedures.

The Committee started to work 17 October and finished 15 November 2019. The main tasks of the Committee were:

- to investigate and evaluate all circumstances, procedures and facts during official control of sulphites in meat preparations;
- to investigate and evaluate way of informing and communicating with the public in this case;
- to prepare a report on findings.

Committee had access to all documentation in regional units of Competent Authority in Slovenia, for each case of official control regarding sulphites in meat preparation. During internal audit different actions have been implemented to collect all information, facts and to identify all circumstances:

- checking all documentations: inspection records and other relevant documentation was examined to determine whether the inspection procedure was conducted in accordance with the provisions of EU food legislation and with inspection legislation;
- interviews with responsible inspectors to understand decisions and measures required by inspectors during official control;
- meetings of the members of the Committee to exchange views and opinions on findings.

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This approach of investigation provided all relevant information and findings for Committee to prepare the final report for the Minister.

## RESULTS

### Alert identification and risk management

The alert started with a telephone notification by a consumer to the competent authority - Administration for Food Safety, Veterinary Sector, and plant Protection (Administration) in December 2017, regarding health problems related to the consumption of meal, prepared from minced meat. However, this first information received no response. Consequently, the consumer sent a written complaint to the competent authority in March 2018 with a reference to the previous telephone conversation and clearly described all the health problems that occurred after consuming a meal with minced meat (severe headache, burning sensation in the throat and stomach, stomach pain and vomiting). At that time the competent authority had not received any other complaints or information about untoward health effects from consumers after consuming meal, prepared from meat and minced meat.

In April 2018, food inspectors carried out official inspections at retail butcher shops in Ljubljana, Slovenia's capital, where the use of the illicit additive in meat preparations was not established. Inspectors looked at premises and at the possible presence of unauthorized additives, but did not take samples of meat preparations, and findings were recorded on an official note, without official minutes. No feedback was provided to the consumer, despite his request for information about his complaint.

In May 2019, the competent authority received a notification by telephone that indicated the use of this additive in the meat products sold in a national retail chain. Based on this report, an inspector carried out an emergency inspection at this supermarket in June 2019 and examined two samples: a sample of a meat preparation and a sample of minced meat, both of which were positive for sulphites.

The inspector informed the responsible person of the internal control of the retail chain but did not issue any further inspection orders or inform the director of Competent Authority. At the same time, in June 2019, the inspector also performed an official check at a supermarket in Ljubljana from another retail chain. The person responsible for the supermarket's retail meat sales admitted using sulphites; nevertheless, the inspector merely made a written note about it, but no sampling was performed. The meat preparations still in the display case were destroyed by the FBO in accordance with the legislation. The inspector did not order any corrective measures or penalties; in addition, no order or request was issued to the FBO to recall the meat products already sold on that day, or the previous days.

Eventually, the inspections made in May-June 2019 triggered a follow-up. In the second half of August 2019, inspectors began monitoring to determine the presence of sulphites in meat preparations, fresh meat and fish with the aim to evaluate the possibly wider incidence of this unfair practice. Five samples were taken in the eastern region of Slovenia: four samples of meat preparation for 'čevapčiči' (traditional minced meat dish) and one sample of fresh salmon with skin: one sample of meat preparation was positive for sulphites. Based on this positive result, the inspection procedure went on by issuing an oral decision as well as, within seven days, a written decision, and initiated an offence procedure; however, a tracing and recall of the food product was not requested. During this inspection, the inspector also found sulphites in a butcher shop and the retailer admitted the use of the illicit additive and his responsibility. In the same period, outside the monitoring plan, two positive samples of meat preparation were found during an inspection at a hypermarket in the Savinjska region (North Slovenia). The amount of sulphur dioxide ranged from 170 +/- 28 mg/kg to 400 +/- 60 mg/kg, and samples were identified as unsafe food [35].

In September 2019, the official veterinarian from competent authority, acting within a different control plan carried out an inspection, where the responsible person of FBO gave a statement that the use of sulphites has been a common practice for a long time. The inspector duly fulfilled the procedures by issuing oral decision, written decision and final decision within the time limit. However also in this case a requirement for a recall was not issued.

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Unfortunately, inspectors did not have clear general guidance and instructions on the notification procedure in cases of finding non-compliant and dangerous foodstuffs.

Official information regarding sulphites in meat preparations was only received by the Minister on 7 October 2019, despite the fact, that the competent authority received the report on the first two positive results on sulphites in food products on 13 June 2019.

At the same time, in September 2019, the competent authority required additional official control regarding unauthorized use of sulphites in fresh meat and meat preparations. Unfortunately, inspectors did not have clear general guidance and instructions on the notification procedure in cases of finding non-compliant and dangerous foodstuffs. In fact, these instructions were still in the drafting phase. Although the instruction refers to Regulation 178/2002, recall of the food product was not required [36].

To summarize, the risk management efficiently dealt with identified cases, yet, there was insufficient awareness about the health risks associated with the illicit use of sulphites in frequently consumed foods (minced meat preparation): such insufficient awareness may explain why tracing and recall actions were not triggered as well as why a more systematic investigation on the use of sulphites was not launched.

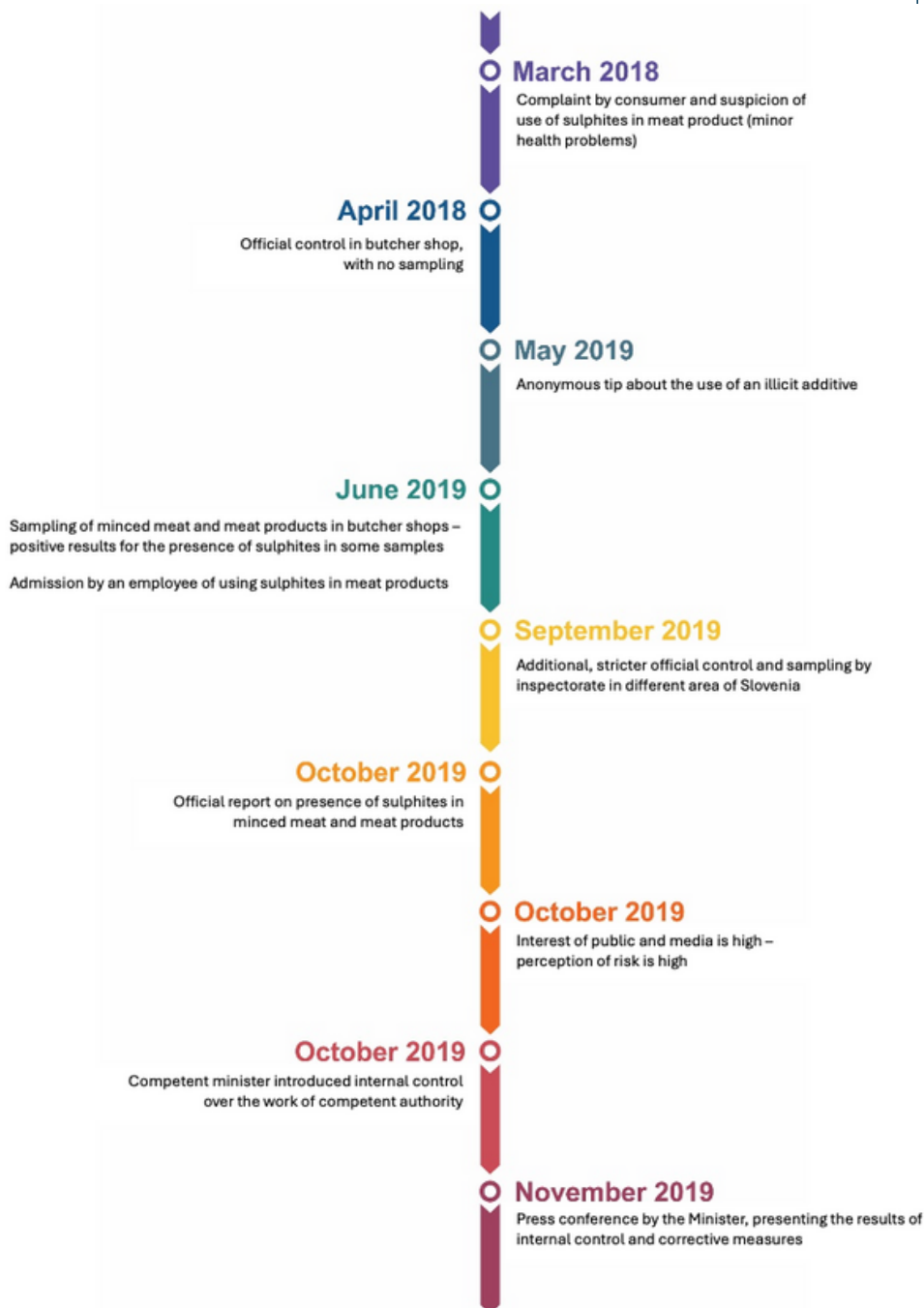
### **Risk communication and public perception**

Figure 1 provides the timeline of risk management and risk communication regarding illegal use of sulphites in Slovenia in 2019. The responsible Minister was informed about the illegal use of sulphites from a journalist's question received on 4 October 2019. In accordance with Article 24 of the State Administration Act, the Director General of the Competent Authority must report regularly to the Minister on the work of the inspectors and inform them of any important cases [37]. Official information regarding sulphites in meat preparations was only received by the Minister on 7 October 2019, despite the fact, that the Competent Authority received the report on the first two positive results on sulphites in food products on 13 June 2019.

The Public Relations and Promotion Service at the Ministry requested that the public be informed properly, in a transparent and clear way, about all the important facts regarding this case. On 9 October 2019, the report and press release regarding sulphites in meat and meat preparations were forwarded by the Public Relation service to all media and published on the Ministry website.

Figure 1. Timeline of risk management and risk communication regarding illegal use of sulphites in Slovenia in 2019

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However, regarding this case, prior to 7 October 2019 there was no notification on the website, nor did the competent authority inform the public about sulphites in meat: nevertheless, there is an applicable Protocol of Communication and Information on Risks in the Republic of Slovenia in the field of ensuring safe food and feed (Protocol).

The competent authority website enables information on unsafe food in the market through the RASFF system. On this website, different notices or news, various information, recommendations, and reports can be published.

However, regarding this case, prior to 7 October 2019 there was no notification on the website, nor did the competent authority inform the public about sulphites in meat: nevertheless, there is an applicable Protocol of Communication and Information on Risks in the Republic of Slovenia in the field of ensuring safe food and feed (Protocol). This Protocol, however, was not implemented in practice [38]. Neither the competent authority nor the FBO recalled the unsafe food in the RASFF, which was not in line with Regulation 178/2002.



Special focus was placed on improving risk communication to protect public health as well as consumer rights to food safety and to keep the public informed.

The FBOs also violated the Consumer Protection against Unfair Commercial Practices Act, which lays out misleading practices, including the intentional omission of mandatory labelling.

The media reacted with great interest to the report on the implementation of additional controls on the use of sulphites in meat preparations. News about the results of official controls was published in various media: national and commercial television, national and regional radio stations, different newspapers, websites, and social media. They also raised reasonable questions as to why the public received no information about the presence of sulphites in meat preparations in June, and why the additional, stricter controls were carried out only in September.

Due to high public interest, the competent Minister imposed an internal audit on the work of the competent authority regarding the official controls on possible use of sulphites in meat preparations. The results of the internal audit and subsequent corrective measures were presented by the Minister at a press conference in November 2019, aiming to enhance better and effective official control and to eliminate food frauds. Special focus was placed on improving risk communication to protect public health as well as consumer rights to food safety and to keep the public informed [39]. The media also reported on the press conference, the findings of the internal audit, and corrective measures requested by the Minister.

Overall, the case study identified a communication gap between food safety bodies and policy makers, as well as a positive role of media, goading authorities to timely and transparent action to protect the public health.

## POLICY IMPLICATION - DISCUSSION

This case study illustrates risk management and risk communication on the illegal use of sulphites: this food fraud represents unintentional harm to consumer's health caused by an intentional act for economic gain. This is one main difference compared to unintentional food safety incidents [40].

Sulphites had been added to food illegally to preserve the appealing red colour of the meat, giving it the appearance of a fresh meat preparation. Meanwhile sulphites are allergens, and the information on their presence in foods is of crucial importance to consumers, while lack of information is detrimental to food safety. The illicit addition of sulphites to meat preparation relates to several violations of core legislations. This practice represents a deliberate misleading of the consumer about the properties and composition of the food, which runs counter to the basic legislation governing food [41], [8] and consumer protection [42]. The FBOs intentionally omitted the labelling of sulphites in meat preparation, knowing that the use of sulphites in this food category is illegal. Thus, the provisions of Regulation (EC) No 1333/2008 and Regulation 1169/2011 stipulating the mandatory labelling of allergens, such as sulphites, were violated. The FBOs also violated the Consumer Protection against Unfair Commercial Practices Act [43], which lays out misleading practices, including the intentional omission of mandatory labelling. Interestingly, in the case of illegal use of sulphites we can recognize all three elements needed for a crime to occur according to the Routine Activity Theory (RAT), i.e., the presence at the same time and in the same place of a suitable target, motivated offender as well the lack of a suitable guardian to prevent the crime [44], [15]. In our case study: the motivated offender as the FBO, the suitable targets as consumers and lack of a suitable guardian as insufficient official control.



The competent authority issued warnings and other corrective measures regarding this case. In accordance with the Inspection Act, a warning can be imposed as the mildest inspection measure in case of a lower level of risk for consumers. Such a case enables “softer” action if the FBO is aware of its non-compliance and of the need to correct it [45]. The inspector is obliged to make their own decisions regarding procedures and measures to be imposed based on reports of positive samples for sulphites content, the employee recognition of the use of such an additive and the risk assessment, e.g., an exposure assessment based on the detection of unacceptable substances in widely consumed foods, such as meat preparations. In this case, the action taken by the competent authority was too late, occurring only in mid-October 2019.

Where there is a confession of the offender and a positive report on the unsafe sample, this provides evidence of committing a violation of food law [41] and such food product should not be put on the market. Production and selling of unsafe foods are illegal and should be prosecuted by the competent authority [46]. Besides the possible risk for the general population exposed to excessive levels [14], sulphites in food represent a recognized danger to the health of people who are hypersensitive to sulphites. By destroying meat preparations without sampling, official inspectors violated the obligation of securing evidence. As the confessions of the responsible persons were not supported by evidence (no samples taken), the prosecution of this unfair practice and food fraud was not feasible.

When the competent authority identifies non-compliance, it shall take action to ensure that the FBO remedies the situation. Such action shall include monitoring and if necessary, ordering the recall, withdrawal and/or destruction of food [46]. In this case, the inspectors did not act against the FBO by requesting a recall for the sold meat preparations, though they demanded the withdrawal and destruction of the unsold quantity.

The competent authority knew about the first finding of sulphites in five samples of meat preparations from the butcher's shops of retail chains in June 2019. Additional, closer control by the inspectors was carried out for the first time in September 2019. The first official report and informing the public occurred in October 2019 [35]. Consumers were not warned on how to handle meat preparations that they had already purchased: indeed, some consumers who bought meat products in the summer may have frozen a certain unused amount for later use. In this regard, the competent authority informed consumers that the freezing of meat preparations was not a common storage practice [36]. Otherwise, the food label would indicate that it is not suitable for re-freezing. Consumers should have been informed about it, but they were not, which was also pointed out by the Slovenian Consumers' Association; they also emphasized that freezing meat preparations was not an unusual consumer practice [47]. Overall, three problems were identified in regard of consumer's information: i) consumers hypersensitive to sulphites were not informed of the hazardous foods present on the market, neither through the RASFF system nor by relevant statements of the competent authorities in the media; ii) the consumers were not instructed in time to dispose of any purchased and frozen minced meat and meat preparations in the period from June 2019 and October 2019; iii) even the rights of consumers who are not allergic to sulphites have been affected, as all consumers have the basic right to be informed of all the ingredients in the food they consume [8].

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Where the product had reached the consumer, the FBO should have effectively and accurately informed the consumers of the reason for its withdrawal and should have recalled from consumers the products already supplied to them, to achieve a high level of health protection.

In any case food fraud is a food-industry issue where the effect is often a public health threat, yet the cause or motivation is economic.

Using a HACCP-like approach, sulphites in meat preparation may be readily identified as a likely hazard in a country like Slovenia, due to widespread consumption of meat preparations like “čevapčiči”, the wish to attract consumers with a “fresh meat look” and the easy availability of sulphites.

The identified shortcomings in risk management may be due to different causes, such as:

- insufficient communication and co-operation among offices;
- insufficient collection, storage, analysis, and utilization of data at regional and/or central level, as well insufficient awareness about the health risks due to sulphites and lack of basic training of inspectors and other risk managers in risk assessment [34].

Finally, the crucial role of the FBO in ensuring food safety was missing in the risk management of the Slovenian sulphite alert. The FBO should have immediately initiated procedures to withdraw the food from the market. Where the product had reached the consumer, the FBO should have effectively and accurately informed the consumers of the reason for its withdrawal and should have recalled from consumers the products already supplied to them, to achieve a high level of health protection.

Meat preparations represent important sources of SO<sub>2</sub> exposure, especially in adults and young people in many countries [18], [16], [19], [20], [17], [21], [22]. Risk assessors and risk managers should be aware that in today's technological age, a purely reactive response to the various types of food frauds is neither efficient nor effective [48], [49], [50]. In the run for profit in a global, competitive market consumers are easy targets for unlawful acts by importers, producers, wholesalers, or retailers who intend to increase profits with less capital and equipment, while avoiding detection [26], [51], some cases, like the illegally import of bush meats [52] are potentially linked to criminal activities. In any case food fraud is a food-industry issue where the effect is often a public health threat, yet the cause or motivation is economic [40].

Any plans and actions to mitigate or prevent the risks associated with food fraud should consider a whole food chain approach. Using a HACCP-like approach, sulphites in meat preparation may be readily identified as a likely hazard in a country like Slovenia, due to widespread consumption of meat preparations like “čevapčiči”, the wish to attract consumers with a “fresh meat look” and the easy availability of sulphites. In addition, beyond the traditional food safety scope, some activities against food frauds may require applying methods closer to criminal investigation [33]. In any case food fraud is, indeed, a food-industry issue. It is important to emphasize that although the cause or motivation is economic or financial, the effect is often a public health threat [40].

Our case study highlighted the key importance of risk communication addressed to policy makers, the media and general public as well as stakeholders (FBOs, consumer associations). Food safety situations that require urgent communication to prevent or reduce the risks of significant harm are often associated with many gaps in knowledge. Where there is uncertainty, this should be acknowledged and explained, together with what is being done by risk assessors and managers to address the uncertainty, and the implications for target audiences [53], [54], [31], [34], [55].

Moreover, risk communication cannot be a pure one-way process. Risk communicators should understand and respect risk perceptions of average consumers.

It is important to recognize and respect differences in perception, which may be due to economic, social, or cultural differences [23], because they could contribute to disagreeing views between experts and the public about managing risk [56], [29].

In general, consumers are more ready to accept information that is consistent with their previous beliefs [6] meanwhile, negative emotions such as fear, confusion and worries about their health are major factors in the public's risk perception during food safety alarms [57], [31], [6], [57]. In the case of chemical hazards, consumers often perceive chemicals in food as high-risk to their health [5] and/or posing unacceptable concerns because they are involuntary, unrecognized hazards presenting an unknown effect on health [58], [59]. The presence of perceived benefits mitigates the risk perception [7], [60].

In our case study, there was a low perception of the risks of sulphites among the Slovenian general consumers, and a deficient communication by the food safety authorities (the experts) to the policy makers, as political representatives of the general public. Meanwhile, the media and the consumers association played a goading role that helped to stir a more effective response. In fact, rather than the usual one-way communication, in several instances experts and the public engage in an interactive exchange, as the increasingly relevant field of Citizen Science shows [61]. Our case study shows that public authorities may profit from inputs by media and citizen's organizations in food safety alerts.

Finally, the case of sulphites in meat products in Slovenia highlights the role of continuous and timely information exchange. There is no such thing as "zero" risk in food safety, or in life more generally, despite the efforts of governments and inspection bodies to prevent food fraud [25]. Nevertheless, all evidence should be collected, and efforts should be made to reduce the risks. This is the reason why the European Commission set up the Food Fraud Network as a network of the Commission, the European Union Agency for Law Enforcement Cooperation (Europol), the liaison bodies designated by the Member States, and where relevant, the European Union's Judicial Cooperation Unit (Eurojust). Since 2013, EU Member States and some other European countries (Switzerland, Norway and Iceland) exchange information and cooperate in matters where they are confronted with violations of the EU agri-food chain legislation of a cross-border nature. The EU Food Fraud Network allows assisting and coordinating communication between competent authorities and transmitting and receiving requests for assistance. The liaison bodies are required to exchange information necessary to enable the verification of compliance with EU agri-food chain legislation with their counterparts and, in certain cases, with the Commission, where the results of official controls require action in more than one country [62].

At the international level, the International Food Safety Authorities Network (INFOSAN) managed jointly by the Food and Agricultural Organization of the United Nations (FAO) and the World Health Organization (WHO) is an important global network. It includes national food safety authorities and provides an important platform for the rapid exchange of information during food safety emergencies and for sharing data and information [40].

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Our case study shows that public authorities may profit from inputs by media and citizen's organizations in food safety alerts.

There is no such thing as "zero" risk in food safety, or in life more generally, despite the efforts of governments and inspection bodies to prevent food fraud.

Other shortcomings concerned insufficient communication between food safety responsible and policy makers as well as here lack of understanding of consumer's risk perception; meanwhile, media and consumer's association had a positive goading role.

Ineffective, improper risk management in this case reflects a lack of effective training for inspectors as well as a lack of internal risk communication.

## SUMMARY AND CONCLUSIONS

This article highlights critical aspects of risk management and risk communication as important stages of ensuring food safety in case of food fraud. Despite the clear and unambiguous legislative rules and provisions, the implementation in practice by the FBOs as well as by the competent authority was not optimal, possibly also due to insufficient awareness of sulphite-related health risks. Other shortcomings concerned insufficient communication between food safety responsible and policy makers as well as here lack of understanding of consumer's risk perception; meanwhile, media and consumer's association had a positive goading role. The traditional food safety approaches may not be the most effective option for detecting or deterring food fraud. Prevention of risks from food fraud requires an interdisciplinary approach with new methods and corrective measures combining criminology with other expert fields: food safety, public health, food science, consumer protection, supply chain management, and social anthropology [33].

Providing corrective measures against food fraud by the responsible authority needs to be improved by means of clear standard operating procedures, including decision trees for issues requiring a case-by-case approach. Consumer awareness of risks and mitigating measures (such as disposal of frozen foods purchased in a certain period) are of paramount importance to integrate the official measures taken by authorities.

Ineffective, improper risk management in this case reflects a lack of effective training for inspectors as well as a lack of internal risk communication. Late and incomplete notification is unacceptable in ensuring food safety and consumer protection. It shows a clear disregard for the basic principles and objectives of effective risk communication: timeliness, transparency, consideration of consumer perceptions, their legitimate concerns, and fears. Recognizing the hazard, defining the problem, and understanding the nature and level of the risk are crucial before developing prevention, intervention, and response plans in case of food fraud.

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