

FOOD INTEGRITY THROUGH FINANCIAL RESPONSIBILITY AND LEGISLATIVE CONTROL

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Abstract: *One of the major issues facing the food sector is food fraud, which affects consumer safety, the integrity of the food supply chain, and trust in production and marketing systems, generating health risks, economic losses, and decreased confidence in the food market. In this context, meat and meat products are among the most exposed to food fraud due to their high economic value and the difficulty of visual verification. Common practices include substitution with cheaper species, the use of leftovers, and additives that alter weight or appearance. False labeling regarding origin, quality, and expiration date can mislead consumers. Combating this phenomenon requires appropriate legislation, effective controls, transparency, and food education, involving authorities, producers and consumers.*

Key words: *food fraud, consumer safety, meat products, legislation, food integrity*

INTRODUCTION

Food integrity is a fundamental principle in ensuring the proper, transparent, and ethical functioning of the agri-food supply chain. It implies that food products are authentic, safe, compliant with current legislation, and free from intentionally deceptive practices.

Over the past decade, the visibility of food fraud has increased dramatically, representing a serious threat to the integrity of the global agri-food marketing system. Notorious scandals, such as the 2013 horse meat scandal and other meat product adulteration cases [8,23], recurrent fraud in the olive oil sector [3,33,35], honey adulteration [38,39], and fraud in the fish and seafood sector [41,42], have revealed major vulnerabilities within the global food supply chain and have underscored the need to align financial accountability with a strict legislative framework.

Food fraud has severe consequences: it endangers public health, generates economic losses for compliant operators, and undermines public trust in regulatory authorities. In this context, increasing emphasis is placed on sustainable ethics, the development of critical thinking, systemic analysis capacity, and a profound awareness of global challenges related to food security [3]. This article analyzes the relationship between financial responsibility, legislative control, and food integrity, including the main types of food fraud, high-risk products, their impact, and preventive measures.

MATERIALS AND METHODS

The study is based on a qualitative analysis of issues related to food fraud, drawing on legislative documents, institutional reports, and key scientific publications. These sources were examined using thematic analysis, enabling the identification of connections between mechanisms of financial accountability, legislative requirements, and outcomes related to the prevention of food fraud.

RESEARCH RESULTS

Financial responsibility, the foundation of food fraud prevention

Food fraud is predominantly driven by economic motivations, which explains the need for robust mechanisms of financial accountability capable of limiting opportunities for fraud and deception within the agri-food supply chain [20,28]. In this context, the implementation of internal financial auditing, risk management, economic flow analysis, and rigorous supplier verification plays a vital role in preventing fraudulent behavior.

Recent studies from scientific literature indicate that operators who adopt such mechanisms exhibit reduced vulnerability to substitution or dilution, benefit from more transparent financial traceability, and are able to rapidly identify suspicious transactions or economic irregularities within the supply chain [17,29]. The economic logic underlying the deterrence of food fraud relies on increasing both the probability of detection and the severity of sanctions, while simultaneously ensuring the effectiveness of law enforcement [18]. Stakeholders should recognize that measures enhancing transparency and traceability fundamentally alter the cost-benefit calculation for potential fraudsters by increasing the likelihood of detection [30]. The European FoodIntegrity project and recent research in the field of food authenticity highlight that investments in modern technologies such as blockchain for traceability, DNA-based analyses, and advanced spectroscopic tools, significantly contribute to fraud risk reduction by enhancing transparency and the capacity to verify the authenticity of food products [5,21,31]. Consequently, financial accountability and digitalization become central components of a modern strategy for safeguarding food integrity.

The Main Types of Food Fraud

In European Union legislation, there is no explicit definition of the concept of “fraud” in the agri-food supply chain. However, implementing Regulation (EU) 2019/1715 provides indirect guidance through the definition of a “fraud notification,” by specifying the key elements that must be taken into account. Accordingly, agri-food fraud is defined as “a non-compliance concerning any suspected intentional action by businesses or natural persons, aimed at deceiving buyers and obtaining an undue advantage, in breach of the rules referred to in Article 1(2) of Regulation (EU) 2017/625” [4]. Fraud is deemed to occur when four conditions are simultaneously fulfilled: (1) the breach of one or more provisions of European Union legislation governing the agri-food chain, (2) deception of customers, (3) the existence of an economic advantage for the perpetrator, and (4) intent (deliberate non-compliance) [46]. At the national level, pursuant to Government Ordinance No. 42/2004, Article 1, paragraph (k), food fraud is defined, and the applicable control and sanctioning measures in cases of fraudulent practices are stipulated [1].

Although there is no universally accepted definition of food fraud, it generally encompasses practices such as adulteration (including substitution, dilution, and the use of unauthorized additives, as well as the physical or chemical manipulation of products), the falsification of labels or quality and origin certifications, as well as counterfeiting and smuggling [31,44,47]. Substitution, one of the most common forms of adulteration, involves replacing high-value ingredients with inferior alternatives, such as the use of pork or horse meat instead of beef, the substitution of premium fish species with lower-cost varieties, or the adulteration of honey with sugar-based syrups [14,47].

Moreover, the use of illegal pesticides in conventional agriculture to maintain crop productivity and quality can result in agri-food products containing pesticide residues above the permitted limits [47]. The consumption of such foods exposes consumers to harmful and unhealthy substances, posing risks of food toxicity. Dilution and the use of

unauthorized additives constitute a broad category of fraud commonly encountered in the dairy sector, involving the addition of water, starch, vegetable fats, or unauthorized additives to artificially increase volume or to mask deficiencies in quality [15,43].

Furthermore, physical or chemical manipulation achieved through the artificial modification of a product's color, flavor, or consistency is used to mask deterioration or to create the appearance of superior quality, a practice documented in numerous studies on food authenticity [19]. False labeling includes the misattribution of geographical origin, such as honey labeled as originating from the EU despite being imported from Asia, the inaccurate formulation of nutritional claims, or the deliberate alteration of expiration dates [16,44]. The falsification of quality certifications such as the unauthorized use of labels like "organic," "PDO," or "PGI", directly undermines the credibility of European systems for the protection of geographical indications and is increasingly reported within EU monitoring networks [7,13]. The counterfeiting of food products involves the deliberate imitation of authentic food products (of well-established brands) or their packaging and logos in order to deceive consumers, practices that often also entail infringements of intellectual property rights (IPR).

These forms of fraud compromise the integrity of the food market, consumer safety, and public trust, which is why they are subject to continuous monitoring within European surveillance systems such as the EU Agri-Food Fraud Network [10].

Products with a high risk of fraud

Products at high risk of fraud are those with high economic value, strong global demand, or physical characteristics that facilitate substitution, dilution, or falsification without being easily detectable. At the global level, the WTO [47] ranks products with a high risk of food fraud based on the value of global trade in 2021 as follows: meat (USD 168 billion), seafood and fish products (USD 160 billion), alcoholic beverages (USD 98 billion), coffee (USD 42 billion), milk (USD 31 billion), fruit and vegetable juices (USD 15 billion), spices (USD 13 billion), olive oil (USD 9 billion), honey (USD 3 billion), and organic products. According to analyses conducted by the Joint Research Centre 2025 [9] and the EU Food Fraud Network [12], the most vulnerable categories are meat and fish, extra-virgin olive oil, dairy products, honey, and spices.

Meat and fish products are frequently subject to species substitution, for example, horse meat being labeled as beef or low-cost fish species being marketed as premium varieties, a phenomenon documented in numerous DNA-based studies [36,40]. Olive oil is considered the most frequently adulterated food product worldwide, as it is often blended with refined oils or oils of different origin in order to imitate the properties of extra-virgin olive oil [5,35]. In the case of dairy products, fraud includes diluting milk with water and replacing dairy fats with vegetable fats [15,43], and in the honey sector, adulteration with glucose or fructose syrups is widely documented and difficult to detect through classic tests [38]. Spices such as saffron, oregano, and turmeric exhibit high rates of adulteration through the addition of inexpensive plant materials or synthetic colorants [22]. These risks are reaffirmed annually in European monitoring reports and in the scientific literature dedicated to the identification of food authenticity [32].

Impacts of Food Fraud on Public Health and the Food Market

Illicit trade in agri-food products and beverages negatively affects agriculture, destabilizes rural economies, distorts food markets, and jeopardizes the production and delivery of fair, safe, and sustainable food and beverages [22]. The impact of food fraud is multifaceted, affecting public health, the economy, consumer trust, and the effective functioning of national control systems. From a public health perspective, fraudulent foods

may contain undeclared allergens, contaminants, or inappropriate ingredients, thereby posing acute or chronic risks to consumers [25,44]. From an economic perspective, global losses generated by food fraud are estimated at between USD 30 and 50 billion annually [47], while in Romania legitimate operators are directly affected through unfair competition, market disruptions, and the devaluation of domestic products. At the institutional level, the Romanian surveillance system, coordinated by the National Sanitary Veterinary and Food Safety Authority (ANSVSA), plays a crucial role in managing the impact of food fraud through annual control programs, thematic inspections, border checkpoint controls, and the monitoring of high-risk products, in accordance with the requirements of Regulation (EU) 2017/625. These programs contribute to the rapid identification of non-compliances and to the withdrawal of falsified products from the market, thereby reducing negative effects on consumers and protecting the integrity of the national food supply chain [2,11]. However, European reports and academic analyses highlight persistent challenges, such as limited laboratory resources and the need for the digitalization of traceability systems [23,34]. In the social sphere, food fraud undermines consumer trust in institutions and in Romanian brands, while repeated public exposure to food scandals affects purchasing behavior and the overall perception of food safety [6,26].

Moreover, food fraud generates substantial economic losses at the global level [24]. Consequently, the impact of food fraud is profound and requires a coordinated response at both global and national levels.

Prevention and control

The prevention and control of food fraud require an integrated approach based on legislative, technological, financial, and institutional instruments. At the European level, Regulation (EC) No. 178/2002 establishes the general principles of food safety, while Regulation (EU) 2017/625 introduces risk-based official controls aimed at the rapid identification of vulnerabilities within the food supply chain [11,37]. Modern prevention tools include advanced analytical methods such as spectroscopy, DNA barcoding, and isotopic profiling techniques, which enable the detection of fraudulent ingredients [19]. Digital technologies such as blockchain, traceability platforms, and integrated databases have proven effective in enhancing transparency and reducing opportunities for fraud [17,21]. In addition, internal audits, supply chain analysis, and transaction monitoring are considered critical factors in preventing economic food fraud [34]. At the institutional level, networks such as the EU Agri-Food Fraud Network facilitate the rapid exchange of information between Member States and the coordination of cross-border interventions [10,13]. In addition, consumer education, transparent labeling, and strict sanctions complement the preventive framework necessary for reducing the incidence of food fraud [27].

CONCLUSIONS

Food fraud is a complex phenomenon, primarily driven by economic motivations, and its effective prevention requires an integrated approach that combines financial accountability with a strict and consistently enforced legislative framework. The analysis highlights that the most frequent forms of fraud include ingredient substitution, false labeling, and product dilution—practices that occur particularly in high-risk categories such as meat, olive oil, dairy products, honey, and spices.

Food fraud, regardless of its nature, can have significant consequences for consumer health by leading to exposure to contaminants or undeclared allergens; it also generates considerable economic losses while simultaneously undermining public trust in

the safety and authenticity of food products. Effective prevention requires the use of modern authentication technologies, the implementation of rigorous financial auditing, and the conduct of well-structured official controls aligned with European regulations. Furthermore, consistent marketing and information efforts are necessary to enhance awareness among both producers and traders. Public institutions should also direct their interventions toward continuous consumer education and information programs, promoting, among other aspects, responsible practices such as the careful reading of product labels at the point of purchase. Strengthening these efforts represents an essential element in the prevention and mitigation of food fraud. In this context, close cooperation among authorities, industry stakeholders, and consumers becomes crucial for safeguarding the integrity of the food supply chain and for consolidating a transparent and safe food system.

REFERENCES

- [1]. ANSVSA, 2019, HOTĂRÂRE privind stabilirea și sancționarea contravențiilor la normele sanitar - veterinare și pentru siguranța alimentelor. Available online: https://www.ansvsa.ro/wp-content/uploads/2019/11/Proiect_HG_contravenitii_norme_svsanotafundamentare-30.10.2019.pdf
- [2]. ANSVSA, 2025, Comunicat Serviciul Comunicare și Logistică Documentară, Campania națională de control „Zero toleranță pentru neregulile alimentare”. Available online: <https://www.ansvsa.ro/blog/ansvsa-confirma-masuri-ferme-pentru-protejarea-sanatatii-consumatorilor-si-combaterea-fraudelor-alimentare-la-finalul-campaniei-zero-toleranta-pentru-neregulile-alimentare/>
- [3]. BALAN I.M., TRASCA T.I., OCNEAN M., HORABLAGA A., MATEOC-SIRB N., SALASAN C., TIU J.V., RADOI B.P., LIL, R.A., FIRU NEGOESCU G.A., 2025, Connecting SDG 2: Zero Hunger with the Other SDGs—Teaching Food Security and the SDGs Interdependencies in Higher Education, *Sustainability*, 17(16), 7496. <https://doi.org/10.3390/su17167496>
- [4]. COMISIA EUROPEANĂ, 2019, Regulamentul de punere în aplicare (UE) 2019/1715 al Comisiei din 30 septembrie 2019 de stabilire a normelor privind funcționarea sistemului de gestionare a informațiilor pentru controalele oficiale și a componentelor sistemice ale acestuia (Regulamentul IMSOC), *Jurnalul Oficial al Uniunii Europene*, L 261, 37–96. Available online: <https://eur-lex.europa.eu/legal-content/RO/TXT/?uri=CELEX%3A32019R1715>
- [5]. CONTE L., BENDINI A., VALLI E., LUCCI P., MORET S., MAQUET A., LACOSTE F., BRERETON P., GARCÍA-GONZÁLEZ D.L., MOREDA W., GALLINA TOSCHI T., 2020, Olive oil quality and authenticity: A review of current EU legislation, standards, relevant methods of analyses, their drawbacks and recommendations for the future, *Trends in Food Science & Technology*, 105, 483–493. <https://doi.org/10.1016/j.tifs.2019.02.025>
- [6]. DJEKIC I., SMIGIC N., 2024, Consumer perception of food fraud in Serbia and Montenegro, *Foods*, 13(1), 53. <https://doi.org/10.3390/foods13010053>
- [7]. DUARTE B., MELO J., MAMEDE R., CARREIRAS J., FIGUEIREDO A., FONSECA V.F., SOUSA M.L. DE, SILVA A.B., 2023, In the trail of “Maçã de Alcobaça” protected geographical indication (PGI): Multielement chemometrics as a security and anti-fraud tool to depict clones, cultivars and geographical origins and nutritional value. *Journal of Food Composition and Analysis*, 115, 104976. <https://doi.org/10.1016/j.jfca.2022.104976>

- [8]. **ELLIOTT C.**, 2014, Elliott Review into the Integrity and Assurance of Food Supply Networks. DEFRA. Available online: <https://www.gov.uk/government/publications/elliott-review-into-the-integrity-and-assurance-of-food-supply-networks-final-report>
- [9]. **EUROPEAN COMMISSION&JRC**, 2025, Knowledge Centre for Food Fraud and Quality. Available online: https://knowledge4policy.ec.europa.eu/food-fraud-quality/jrc-food-fraud-monthly-report_en
- [10]. **EUROPEAN COMMISSION**, 2024, The EU Agri-Food Fraud Network, Available online: https://food.ec.europa.eu/food-safety/eu-agri-food-fraud-network_en
- [11]. **EUROPEAN COMMISSION**, 2017, Regulation (EU) 2017/625 on official controls. Available online: https://food.ec.europa.eu/horizontal-topics/official-controls-and-enforcement/legislation-official-controls_en
- [12]. **EUROPEAN COMMISSION**, 2024, EU Food Fraud Network Annual Report 2023. Available online: <https://ec.europa.eu/newsroom/sante/items/847722/en>
- [13]. **EUROPEAN COMMISSION**, 2025, Health and Food Safety 2024: Annual report – Alert & Cooperation Network. Directorate-General for Health and Food Safety. Publications Office of the European Union. <https://doi.org/10.2875/039722>
- [14]. **EVERSTINE K., SPINK J., KENNEDY S.**, 2013, Economically motivated adulteration (EMA) of food: common characteristics of EMA incidents, *Journal of food protection*, 76(4), 723–735. <https://doi.org/10.4315/0362-028X.JFP-12-399>
- [15]. **FERREIRA J.L.A., ALMEIDA L.F. DE, SIMÕES S. DA S., DINIZ P.H.G.D., FERNANDES D. D. DE S.**, 2025, Raman spectroscopy-based authentication of powder goat milk adulteration with cow milk, *Food Control*, 167, 110800. <https://doi.org/10.1016/j.foodcont.2024.110800>
- [16]. **FOOD AUTHENTICITY**, 2025, FAN 2024 Global Food Fraud Report. Available online: <https://documents.foodauthenticity.global/index.php/mnu-arts/edoc-articles/fan-2024-global-food-fraud-report>
- [17]. **GALVEZ J.F., MEJUTO J.C., SIMAL-GANDARA J.**, 2018, Future Challenges on the Use of Blockchain for Food Traceability Analysis, *Trends in Analytical Chemistry*, 107, 222-232. <https://doi.org/10.1016/j.trac.2018.08.011>
- [18]. **GIANNAKAS K., YIANNAKA A.**, 2023, Food fraud: Causes, consequences, and deterrence strategies, *Annual Review of Resource Economics*, 15, 85–104. <https://doi.org/10.1146/annurev-resource-101422-013027>
- [19]. **GOMES A. DE A., AZCARATE S.M., ŠPÁNIK I., KHVALBOTA L., GOICOECHEA H.C.**, 2023, Pattern recognition techniques in food quality and authenticity: A guide on how to process multivariate data in food analysis, *Trends in Analytical Chemistry*, 164, 117105. <https://doi.org/10.1016/j.trac.2023.117105>
- [20]. **GUSSOW K E.**, 2020, Finding food fraud: Explaining the detection of food fraud in the Netherlands. [PhD-Thesis- Research and graduation internal, Vrije Universiteit Amsterdam]. Available online: <https://research.vu.nl/en/publications/finding-food-fraud-explaining-the-detection-of-food-fraud-in-the-/>
- [21]. **HAIDER A., IQBAL S.Z., BHATTI I.A., ALIM M.B., WASEE, M., IQBAL M., KHANEGHAH A.M.**, 2024, Food authentication, current issues, analytical techniques, and future challenges: A comprehensive review, *Comprehensive Reviews in Food Science and Food Safety*, 23(3), e13360. <https://doi.org/10.1111/1541-4337.13360>
- [22]. **HAM J.-H., LEE Y.-J., LEE S.-S., KIM H.-Y.**, 2025, Food fraud in plant-based proteins: Analytical strategies and regulatory perspectives, *Foods*, 14(9), 1548. <https://doi.org/10.3390/foods14091548>
- [23]. **HASSOUN A., MÅGE I., SCHMIDT W.F., TEMIZ H.T., LI L., KIM H.-Y., NILSEN H., BIANCOLILLO A., AÏT-KADDOUR A., SIKORSKI M., SIKORSKA E., GRASSI S., COZZOLINO D.**, 2020, Fraud in Animal Origin Food Products:

Advances in Emerging Spectroscopic Detection Methods over the Past Five Years, *Foods*, 9(8), 1069. <https://doi.org/10.3390/foods9081069>

[24]. KENDALL H., KUZNESOF S., DEAN M., CHAN M.Y., CLARK B., HOME R., STOLZ H., ZHONG Q., LIU C., BRERETON P., FREWER L., 2019, Chinese consumer's attitudes, perceptions, and behavioural responses towards food fraud, *Food Control*, 95, 339–351. <https://doi.org/10.1016/j.foodcont.2018.08.006>

[25]. KYRGIAKOS L.S., HAZIMEH M., VASILEIOU M., KLEISIARI C., KLEFTODIMOS G., VLONTZOS G., 2024, The food fraud landscape: A brief review of food safety and authenticity, *Proceedings*, 94(1), 6. <https://doi.org/10.3390/proceedings2024094006>

[26]. LIU P., MA L., 2016, Food scandals, media exposure, and citizens' safety concerns: A multilevel analysis across Chinese cities, *Food Policy*, 63, 102–111. <https://doi.org/10.1016/j.foodpol.2016.07.005>

[27]. MAGDAS D.A., HATEGAN A.R., DAVID M., BERGHIAN-GROSAN C., 2025, The journey of artificial intelligence in food authentication: From label attribute to fraud detection, *Foods*, 14(10), 1808. <https://doi.org/10.3390/foods14101808>

[28]. MANNING L., MACLEOD A., JAMES C., THOMPSON M., OYEYINKA S., COWEN N., SKOCZYLIS J., ONARINDE B.A., 2024, Food fraud prevention strategies: Building an effective verification ecosystem, *Comprehensive Reviews in Food Science and Food Safety*, 23(1), <https://doi.org/10.1111/1541-4337.70036>

[29]. MANNING L., SOON J.M., 2019, Food fraud vulnerability assessment: Reliable data sources and effective assessment approaches, *Trends in Food Science & Technology*, 91, 159–168. <https://doi.org/10.1016/j.tifs.2019.07.007>

[30]. MARCELLIS-WARIN N.D., PEIGNIER I., GUNTZBURGER Y., 2018, Étude pancanadienne sur les perceptions et les préoccupations de l'industrie agroalimentaire face aux défis de la fraude alimentaire, CIRANO Project Reports. RePEc:cir:cirpro:2018rp-21

[31]. MARÍN X., GRAU-NOGUER E., GERVILLA-CANTERO G., RIPOLLES-AVILA C., CASTILLO M., 2025, Emerging technologies for detecting food fraud: A review of the current landscape in the 2020s, *Trends in Food Science & Technology*, 165, 105313. <https://doi.org/10.1016/j.tifs.2025.105313>

[32]. MOMTAZ M., BUBLI S.Y., KHAN M. S., 2023, Mechanisms and health aspects of food adulteration: A comprehensive review, *Foods*, 12(1), 199. <https://doi.org/10.3390/foods12010199>

[33]. NANOU E., PLIATSIKA N., COURIS S., 2023, Rapid Authentication and Detection of Olive Oil Adulteration Using Laser-Induced Breakdown Spectroscopy, *Molecules*, 28(24), 7960. <https://doi.org/10.3390/molecules28247960>

[34]. OECD, 2022, Illicit Trade in High-Risk Sectors: Implications of Illicit Alcohol for Public Health and Criminal Networks, *Illicit Trade*, OECD Publishing, Paris, <https://doi.org/10.1787/1334c634-en>

[35]. OMWANGE K.A., AL RIZA D.F., SAITO Y., SUZUKI T., OGAWA Y., SHIRAGA K., GIAMETTA F., KONDO N., 2021, Potential of front face fluorescence spectroscopy and fluorescence imaging in discriminating adulterated extra-virgin olive oil with virgin olive oil, *Food Control*, 124, 107906. <https://doi.org/10.1016/j.foodcont.2021.107906>

[36]. PARDO M., JIMÉNEZ E., VIDARSSON J.R., ÓLAFSSON K., ÓLAFSDÓTTIR G., DANÍELSDÓTTIR A.K., PÉREZ-VILLAREAL B., 2018, DNA barcoding revealing mislabeling of seafood in European mass caterings, *Food Control*, 92, 7–16. <https://doi.org/10.1016/j.foodcont.2018.04.044>

[37]. PARLAMENTUL EUROPEAN & CONSILIUL UNIUNII EUROPENE, 2002, Regulamentul (CE) nr. 178/2002 din 28 ianuarie 2002 de stabilire a principiilor și a

cerințelor generale ale legislației alimentare, de instituire a Autorității Europene pentru Siguranța Alimentară și de stabilire a procedurilor în domeniul siguranței produselor alimentare. Jurnalul Oficial al Uniunii Europene, L 31, 1–24. Available online: <https://eur-lex.europa.eu/legal-content/RO/TXT/?uri=CELEX%3A32002R0178>

[38]. **PENG J., XIE W., JIANG J., ZHAO Z., ZHOU F., LIU F.**, 2020, Fast Quantification of Honey Adulteration with Laser-Induced Breakdown Spectroscopy and Chemometric Methods, *Foods*, 9(3), 341. <https://doi.org/10.3390/foods9030341>

[39]. **PUNTA-SÁNCHEZ I., DYMERSKI T., CALLE J.L.P., RUIZ-RODRÍGUEZ A., FERREIRO-GONZÁLEZ M., PALMA M.**, 2024, Detecting Honey Adulteration: Advanced Approach Using UF-GC Coupled with Machine Learning, *Sensors*, 24(23), 7481. <https://doi.org/10.3390/s24237481>

[40]. **RASMUSSEN R.S., MORRISSEY M.T.**, 2008, DNA-Based Methods for the Identification of Commercial Fish and Seafood Species, *Comprehensive reviews in food science and food safety*, 7(3), 280–295. <https://doi.org/10.1111/j.1541-4337.2008.00046.x>

[41]. **REILLY A.**, 2018, Overview of food fraud in the fisheries sector (FAO Fisheries and Aquaculture Circular No. 1165), Food and Agriculture Organization of the United Nations. Available online: <http://www.fao.org/3/i8791en/I8791EN.pdf>

[42]. **SENATHIPATHI D.N., BENJAKUL S., SUKKAPAT P., DETCHAROEN M., MOORTHY G., SAETANG J.**, 2024, DNA Barcoding Revealed Mislabeling of Imported Seafood Products in Thailand, *Fishes*, 9(6), 215. <https://doi.org/10.3390/fishes9060215>

[43]. **SILVIS I.C.J., VAN RUTH S.M., VAN DER FELS-KLERX H.J., LUNING P.A.**, 2017, Assessment of food fraud vulnerability in the spices chain: An explorative study, *Food Control*, 81, 80–87. <https://doi.org/10.1016/j.foodcont.2017.05.019>

[44]. **SPINK J., EMBAREK P.B., SAVELLI C.J., BRADSHAW A.**, 2019, Global perspectives on food fraud: results from a WHO survey of members of the International Food Safety Authorities Network (INFOSAN). *npj Science of Food*, 3(1), 12. <https://doi.org/10.1038/s41538-019-0044-x>

[45]. **SPINK, J., & MOYER, D. C.**, 2011, Defining the public health threat of food fraud. *Journal of food science*, 76(9), R157–R163. <https://doi.org/10.1111/j.1750-3841.2011.02417.x>

[46]. **WINKLER B., MAQUET A., REEVES-WAY E., SIEGENER E., CASSIDY T., VALINHAS DE OLIVEIRA T., VERLUTYEN J., JELIC M., MUZNIK, A.**, 2023, Fighting fraudulent and deceptive practices in the agri-food chain. Technical report “Implementation of Article 9(2) of Regulation (EU) 2017/625” (JRC131525). Publications Office of the European Union. <https://doi.org/10.2760/31366>

[47]. **WTO**, 2024, Illicit trade in food and food fraud. Available online: https://www.wto.org/english/res_e/publications_e/itfff_e.htm