



ISO 14470:2011 and EU legislative background on food irradiation technology: The Italian attitude

Aldo Parlato^{a,*}, Marcella Giacomarra^b, Antonino Galati^c and Maria Crescimanno^c

^aDepartment of Energy, Information Engineering and Mathematical Models, University of Palermo, Viale delle Scienze, Ed. 9, 90128 Palermo, Sicily, Italy (Tel.: +39 09123897359; e-mails: aldoparlato@gmail.com; aldo.parlato@unipa.it)

^bDepartment of Economic, Financial and Statistical Sciences, University of Palermo, Viale delle Scienze, Ed. 2, 90128 Palermo, Sicily, Italy (e-mail: marcella.giacomarra@unipa.it)

^cDepartment of Agricultural and Forest Sciences, University of Palermo, Viale delle Scienze, Ed. 4, 90128 Palermo, Sicily, Italy (e-mail: antonino.galati@unipa.it) (e-mail: maria.crescimanno@unipa.it)

Our work aim is to produce an overview of food irradiation technology at European Union level, with a focus on the Italian context, by specifying the legislative background, detection methods and labelling obligations. We highlight how consumers are too often misinformed about this technology and its benefits. For this purpose, a series of tools aimed at improving the amount of information have been proposed, allowing the consumer to make a free choice about whether or

* Corresponding author.

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<http://dx.doi.org/10.1016/j.tifs.2014.04.001>

not to buy irradiated food based on the correct information received, independent from socio-economic factors. Finally, we show the common effort at EU and International level, represented by the **ISO 14470:2011** quality standard.

Introduction

Food irradiation is physical treatment of food with high-energy ionizing radiation, that produces the same benefits as when it is processed by heat, refrigeration, freezing or treated with chemicals. The process is useful to inactivate micro-organisms, viruses, bacteria or insects, preventing the germination and sprouting of potatoes, onions and garlic, slowing down ripening and ageing of fruit and vegetables, prolonging the shelf life, reducing pathogens in food and thus helping to ensure the protection of consumers' health. Its use is limited but authorized in many countries, and formally approved in 55 countries around the world. A latest review study on the food irradiation status showed a wide spread diffusion of this technique across the world. According to the data in year 2010, about 285,223 tons of food products were irradiated in Asia, 103,000 tons in the United States, and 9264 tons in the European Union. A comparison with the data in 2005 revealed an increase (Kume & Todoriki, 2013). In the EU the use of this technology is recommended for foods frequently contaminated and/or infested with organisms which are harmful to public health, considering that such contamination and/or infestation can no longer be treated with fumigants such as ethylene oxide because of the toxic potential of their residues, therefore, supporting the use of ionizing radiation as an effective means of replacing the previously mentioned substances. Although properly irradiated food is safe and wholesome, consumers are not yet well informed about the technology, and they are currently unable to make their own free choice between irradiated and non-irradiated food. This review aims to present the European legal regulations that has regulated the matter since 1999, with a focus on the situation in Italy. Consumer acceptance of the technology has been reviewed and considered, together with an introduction to the last ISO norm and International commitments.

Food irradiation treatment according to the European Union legislation

At European level, the framework [Directive 1999/2/EC](#) of the European Parliament and of the Council of 22 February

1999, regulates the aspects concerning foods and food ingredients treated by ionizing radiation. It became applicable on the 20th September 2000 and since 20th March 2001 all irradiated foods on the EU market have to comply with its requirements (art. 15). According to art. 7, Member States shall forward the results of checks carried out at the irradiation facilities to the Commission every year, including the categories and quantities of products treated and the dose administered, together with the results of checks carried out at the product marketing stage, as well as the methods used to detect irradiated foods (see Section 2). Moreover, food is only allowed to be irradiated in *approved irradiation facilities* (art. 3). To obtain the approval, facilities have to comply with the requirements of the Joint FAO/WHO Codex Alimentarius Commission Recommended International Code of Practice for the operation of irradiation facilities used for the treatment of foods (FAO/WHO/CAC, Vol. XV – 1st ed.), and any supplementary requirements which may be adopted in accordance with the procedure laid down in art. 12 of the Directive.

A second [Directive \(1999/3/EC\)](#), the Implementing Directive, was issued immediately after the first one, establishing a Community list of foods and food ingredients that can be treated with ionizing radiation. Initially, the EU identifies dried aromatic herbs, spices and vegetable seasoning (such as basil, bird pepper, black pepper, cinnamon, etc.) as food frequently contaminated and/or infested with organisms, which are harmful to public health and for this purpose such contamination and/or infestation can no longer be treated with fumigants such as ethylene oxide because of the toxic potential of their residues. The use of ionizing radiation is presented as an effective means of replacing the substances mentioned above.

Since 2001, the EU irradiation legislative framework came into force, and its effects initiated new legislative acts and accreditation all over the world. According to art. 3 ([Directive 1999/2/EC](#)), through the Decision [2002/840/EC](#), the EU started the approval of facilities, located in third countries, for the irradiation of foods: the first three were located in Hungary and South Africa. Between 2002 and 2012, the Decision will be subject to three amendments: in 2004 Hungary became an EU Member State and was moved from the list produced with the [2002/840/EC](#) to the list approved with [Directive 1999/2/EC](#), while Switzerland and Turkey asked for the approval of their facilities ([2004/691/EC](#)). In 2007, a Thai facility was approved ([2007/802/EC](#)); in 2010, there was the inclusion of three new Indian facilities ([2010/172/EU](#)); the last modification was done in 2012, because the Thai facility changed its official name ([2012/277/EU](#)).

Apart from the countries cited above, other extra EU countries still treat food with ionizing irradiation ([Food Irradiation Treatment Facilities Database – FITF](#)) without asking for EU approval (for example Republic of Korea, China and Vietnam), meaning that food irradiated in those facilities cannot be commercialized inside the EU market but only abroad. The imposed EU limit does not mean that a facility that

irradiates without the EU approval is irradiating illegally. As for other economic issues, the EU needs harmonized framework that allows its single market to work well and under standardized setting, the same regulatory treatment was applied to the irradiation technology. From a commercial point of view we can hazard saying that, maybe, the need of EU approval could reduce the import in some EU countries of irradiated foods treated in third countries without approved facilities. This is a matter of EU concern giving that irradiated food may only be imported from a third country when it has been irradiated in an approved facility. Nowadays, a lot of foods (illegally irradiated and/or not correctly labelled) cross the EU National borders on a daily basis and enter the internal market, without consumer awareness or appropriate scrupulous controls at border levels, from competent National Authorities. According to our study, this aspect represents an input to go further in the subject, not only to raise awareness among consumers, but also to promote more thorough checks at national borders, with the main purpose of limiting the trade of illegally irradiated foods.

In Italy, the implementation of the EU Directives 1999/2/CE and 1999/3/CE occurred through the [Legislative Decree No. 94](#) of January 30, 2001. So starting from March 20, 2001, irradiated food on the Italian markets must comply with the previous mentioned Directives. Member States are requested to implement methods to detect treatment with ionizing radiation at the product marketing stage. For this purpose, the Italian Decree mainly relies on the Istituto Superiore di Sanità – ISS (Italian National Institute for Health) for the duty to select and perform detection methods to be applied on a regional scale ([Boniglia, Onori, & Saporà, 2003, 2004](#)): each region can perform checks at territorial level, even if the final evaluation, must be sent to the ISS in case of doubts. Local Sanitary Laboratories usually work together with Local Branches of Zooprophyllactic Institutes (IZS) and other Public Laboratories ([Chiaravalle, Mangiacotti, & Marchesani, 2011](#)) at regional level in terms of implementing these controls.

According to the EU Regulation n. 882/2004 (art. 33), the Ministry of Health, as a Competent Authority, identifies Laboratori Nazionali di Riferimento – LNR (National Reference Laboratories) with the aim to carry out analysis of food and feed quality (in conjunction with EU Reference Laboratory – EURL). The identification of these LNR takes into account the actual presence of National Reference Centres (CRN). In case of absence of related CRN, the selection of the other LNR takes into account the experience gained in the field from Official Laboratories. Those previously mentioned generally coincide with an IZS or with the Italian National Institute for Health. In the specific case of irradiated food controls, a CRN is currently operative in Italy, specialized in radioactivity (CRN per la ricerca della radioattività nel settore zootecnico – veterinario IZS Puglia e Basilicata – Sede Centrale Foggia) that, in 2010 and 2011, performed controls from abroad free of charge at the marketing stage in a series of Italian regions that

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