

FOOD CONSUMPTION AND INNOVATION: FUNCTIONAL FOODS

VANESSA GIANNETTI (*)¹, ELENA TESTANI (*), LAURA RECCHIA (**)

Abstract

Increasing numbers of scientific evidences demonstrate the health-promoting properties of some foods and food components besides ensuring the basic nutrients intake. The profound changes in the society lifestyles of the last decades have made consumers more conscious regard the connection between health, longevity and diet, orienting their choices towards new food models.

It's particularly interesting the possibility to prevent those diseases that have spread in countries with economic well-being, only modifying eating habits, and, in this contest, functional foods play undoubtedly an outstanding role in the continuous changing demand for foods.

In order to meet these needs, processing industries will have to choose indeed whether to maintain product lines responding to the logic of competition only, or to point to a new development prospective represented by the connection between scientific research and demand for wellness.

The aim of this work is providing an overview on the current worldwide legislative situation, market development and the future potential of functional foods, focusing on the Italian market condition.

Riassunto

Numerose ricerche scientifiche hanno evidenziato la capacità di alcuni alimenti e componenti alimentari di apportare significativi benefici per la salute

(*) Dipartimento per le Tecnologie, le Risorse, e lo Sviluppo, Facoltà di Economia, Sapienza Università di Roma, Via del Castro Laurenziano 9, 00161, Roma, Italia.

¹ Corresponding author: vanessa.giannetti@uniroma1.it

(**) Dipartimento di Scienze per la Salute, Facoltà di Medicina e Chirurgia, Università degli Studi del Molise, Campobasso, Italia.

oltre ad assicurare il fabbisogno ordinario di sostanze nutritive. I molteplici cambiamenti negli stili di vita della società, registrati negli ultimi decenni, hanno reso i consumatori sempre più consapevoli del legame esistente tra salute, longevità e dieta alimentare, orientando così le loro scelte verso nuovi modelli alimentari.

Particolarmente rilevante è la possibilità di prevenire, modificando le abitudini alimentari, quelle patologie che nel corso degli ultimi decenni si sono diffuse a livello epidemico nelle popolazioni dei Paesi in cui c'è benessere economico e, in questo contesto, gli alimenti funzionali giocano un ruolo fondamentale nel continuo mutamento della domanda di beni alimentari. Per far fronte a quanto detto, l'industria alimentare si troverà a dover scegliere se mantenere le linee di prodotto che rispondano ad una logica di sola concorrenza con le altre imprese oppure puntare su una nuova prospettiva di sviluppo, rappresentata dall'incontro tra ricerca scientifica e domanda di benessere.

Il presente lavoro ha lo scopo di fornire una panoramica riguardo al quadro legislativo a livello mondiale, alle dimensioni del mercato ed alle potenzialità future degli alimenti funzionali, focalizzando l'attenzione verso il mercato italiano.

Keywords: Functional food, Functional food market, Food consumption

Introduction

In the last decades, the many changes that have characterized the social economic development have induced profound changes in consumer behaviour, involving, in particular, food consumption dynamics. The elements that have most influenced and still influence consumer eating habits are the lengthening of life expectancy, the progressive aging of population, the health economic and social costs rising, the widespread desire for a better quality of life, media and advertising. These factors are strictly related, even if in different ways, to the continuous changing demand for foods (1). In this contest, the possibility to prevent those diseases that have spread in countries with economic well-being, only modifying eating habits and, in general, the lifestyle is of particular interest. To meet these needs, food industry plays an important role in the promotion of a healthy diet extending the high value-added products supply.

New nutrition frontiers are undoubtedly represented by functional foods, novel foods and nano foods, since in the last decades consumer demands in the field of food production has changed considerably. The concept of "adequate nutrition" which assures the ordinary nutrients needs,

should be substituted with “optimal nutrition” that is the use of foods claimed to have a health-promoting or disease-preventing property besides the basic function. Today foods are not intended to only satisfy hunger and to provide necessary nutrients but also to prevent nutrition-related diseases and to improve physical and mental consumers well-being (2).

In Italy, consumer choice is being increasingly oriented towards high value-added products; “traditional classic” food (pasta, preserves, cheeses, etc.), with about 66% of the total food turnover (about 80 billion euro), still represents indeed an important data but much less than 10 years ago. In fact, a considerable market share, about 20 billion euro (16% of the total turnover), is represented by the “traditional evolved” food; those traditional products which are evolving towards new proposals, not only for packaging and services, but also for their characterization, in order to meet consumer new needs (gravy ready, flavoured oils, pre-cooked meals, etc.). More than 9% of the market is represented by the “protected designation of origin”, the market share of the “novel food”, including functional foods, is on the rise with a value of about 10 billion euro (more than 8% of total turnover) (Table 1, Figure 1).

TABLE 1

ITALIAN FOOD INDUSTRY: TURNOVER OF PRODUCT TYPOLOGY

Typology	Turnover
Traditional classic	79.2 billion €
Traditional evolved	19.2 billion €
Protected designation of origin	11.2 billion € (3 billion € of export)
Novel food	9.6 billion €
Organic food	0.8 billion €
TOTAL	120 billion € (20 billion € of export)

Source: Federalimentare

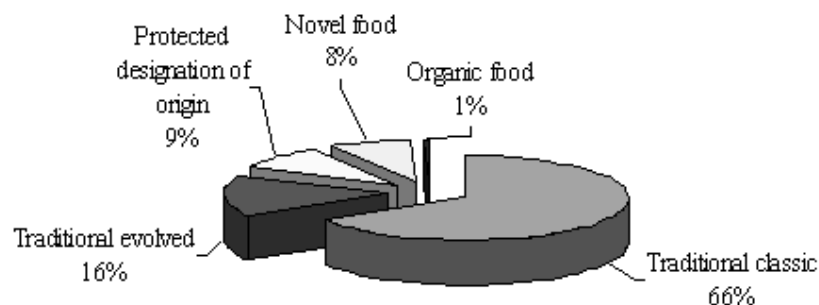


Fig. 1 - Product typologies percentage turnover of the Italian food industry.

Source: Federalimentare

“Novel food” are foods and beverages with high value-added and with high level of innovation and service satisfying consumer demand for food storage, preparation but also for nutrition and health (energy drinks, light foods, products for specific consumer categories, etc.) (3). The “novel food” are products specifically defined by the European Reg. 258/1997, while functional foods are lacking in a legislative definition (4).

Only few foreign nations have precise legislation about functional food definition, labelling and marketing. In Japan, for example, there is a government approval process for functional foods called Foods for Specified Health Use (FOSHU) and their functional property are proved by scientific studies in vivo. However, functional property may be due to natural food composition or to added health-promoting additives, therefore beneficial properties may be exalted respecting the European Reg. 1924/2006 on claims, which collects a list of “nutrients” (proteins, vitamins, fibres, minerals, etc.) and defines “other types substances” as those substances that differ from nutrients with physiological and nutritional effects such as: omega-3 (fat acids preserving organism by cardiovascular diseases), lycopene (antioxidant), lactic acid bacteria, etc (5).

However, at the present state, the lack of a national or European precise legal definition of functional food confuses consumers who often understand information about these foods more like advertising in order to increase sales than like an efficient information medium.

Definition of functional food

The term “functional food” itself was first used in Japan, in the 1980s, for food products fortified with special constituents that possess advantageous physiological effects (6). There isn’t universally accepted definition for this group of food; however, several organizations have attempted to define this emerging food category. In most countries there isn’t a legislative definition of the term and drawing a border line between conventional and functional foods is challenging even for nutrition and food experts (7).

The European Commission’s Concerted Action on Functional Food Science in Europe (FuFoSE), coordinated by International Life Sciences Institute (ILSI) Europe, defined functional food as follows: “*a food product can only be considered functional if together with the basic nutritional impact it has beneficial effects on one or more functions of the human organism thus either improving the general and physical conditions or/and decreasing the risk of the evolution of diseases. The amount of*

intake and form of the functional food should be as it is normally expected for dietary purposes. Therefore, it could not be in the form of pill or capsule just as normal food form” (8-9).

European legislation however, does not consider functional foods as specific food categories, but rather a concept and the regulation of functional foods remains confusing (10-12).

However, the General Food Law Regulation is applicable to all foods and in addition, functional foods can be placed into a number of existing regulatory categories, including dietetic food, medical food, genetically modified organism, food supplements or on novel foods. In the EU, rather than regulating the product group per se, legislative efforts currently being developed are directed towards restricting the use of health claims on packages and in marketing (13-14).

According to the EU regulation on nutrition and health claims made on foods (EC 1924/2006), a list of authorised claims has to be published for all member states, and nutrient profiles also has to be established for foods containing health claims.

Functional food

Functional foods are proposed as a new category of food products that claim to improve health, quality of life, or well-being. In comparison with a conventionally healthy diet as recommended by nutrition experts, the idea of health effects associated with functional foods is based on one single product and its functional components.

In the current social context, there is a potential risk associated with the diffusion of functional foods consumption represented by the “medicalisation” of our dairy food intake.

These products should be intended indeed for use in the context of a healthy lifestyle in order to avoid problems related to unbalanced food models.

Therefore, it should be highlighted that a functional food is a nutrient and it should show its beneficial effects in quantities normally foreseen by a “good diet”. Functional food is not a pill or a capsule, but a part of the normal nutrition.

Functional food class presents a considerable heterogeneity since it includes products from dairy products to cereals, fruit juices, oils. Food typologies more involved in functional foods worldwide market, between 2005-2008, are dairy products long distance followed by “alcohol-free beverages” (Figure 2).

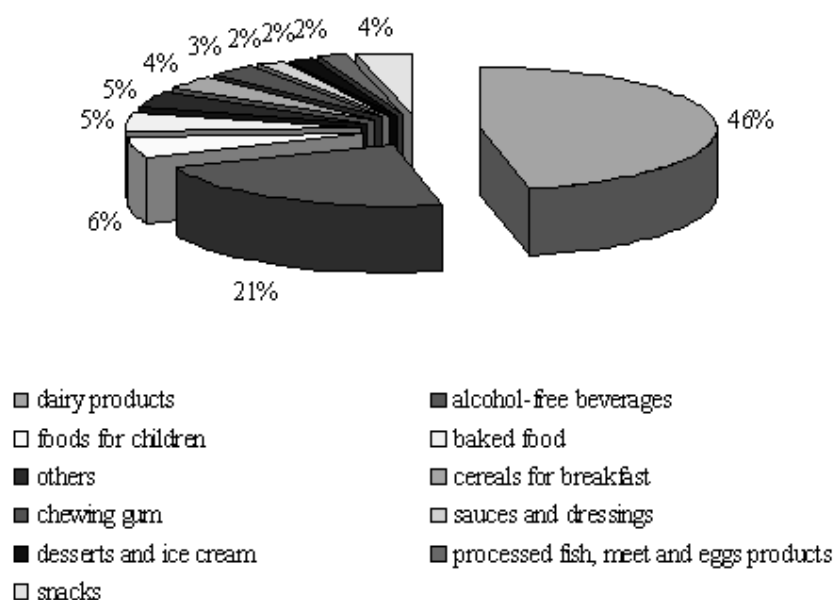


Fig. 2 - Food typologies (% average) with functional claims in the worldwide functional food market (2005-2008).

Source: Jago, 2009 (15)

Most early developments of functional foods were those of fortified with vitamins and/or minerals such as vitamin E, folic acid, calcium (16), subsequently, the focus shifted to foods fortified with various micronutrients such as omega-3, the phytosterol and the soluble fibre (17).

More recently, food companies have taken further steps to develop food products that offer multiple health benefits in a single food (18).

The functional properties can be included in numerous different ways such as improving the regular stomach and colon functions (pre- and probiotics); improving children's life by supporting their learning capability and behaviour; reducing an existing health risk problem such as high cholesterol or high blood pressure and preventing cardiovascular diseases.

Figure 3 shows the functional claims more used in the worldwide food market in 2005-2008.

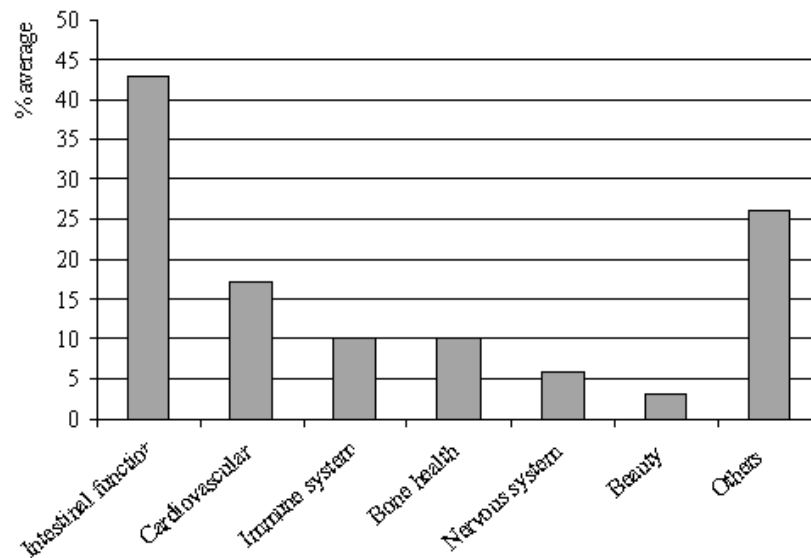


Fig. 3 - Percentage of products with the most common functional claims in the worldwide food market (2005-2008).

Source: Jago, 2009 (15)

Functional foods formulation usually implies ingredients addition, but it may also be realized eliminating, substituting or augmenting some raw materials used according to the traditional recipe, as it can be seen in Table 2.

TABLE 2

FORMULATION OF FUNCTIONAL FOODS: “ACTIONS”

Actions	
“eliminating”	a component which can cause negative effects (e.g. lactose, allergenic proteins, gluten)
“augmenting”	the concentration of a natural component (e.g. micronutrients or functional “no-nutrients”)
“adding”	a normal ingredient not present (e.g. antioxidants, prebiotics)
“substituting”	a component which should be “harmful” if ingested in excess (e.g. fat) with an “helpful” component (e.g. protein microparticles)

The market of functional foods

The growing interest of food industry in functional food field leads up to develop scientific knowledge and innovations in the technological processes of food and beverages with specific nutritional content, allowing consumers to choose according to their lifestyle.

It should be born in mind indeed that the scientific validation of a food therapeutic property, the increasing cost of healthcare, the steady increase in life expectancy, and the desire of older people to improve the quality of their later years induces increasing in demand on these foods which represent an important marketing instrument (19-20).

As it has already been mentioned, it is not clearly defined which foods are considered as functional. Based on a definition by which the functional foods are any products with claims regarding health and their health-promoting property, we can say that the European market for functional foods is the largest with 43% of claims, against the Asian with 31% and the North-American with 15% (Figure 4).

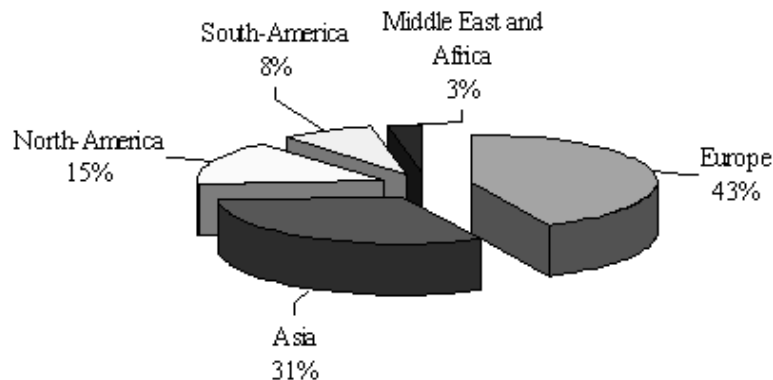


Fig. 4 - Worldwide geographical distribution (% average) of foods with functional claims in the food market.

Source: Nielsen

In the last years, the functional foods market have recorded a substantial growth rate with different trend and intensity depending on countries. According to 2008 estimates, the global market for functional foods was estimated to be of more than 100 billion €, that represented approximately 5% of the total market of food industry (21). In Europe, functional foods sales have increased significantly; Germany, France, the United Kingdom and the Netherlands represent the most important countries within the functional food market (22).

In Italy, functional foods market doesn't reach the other countries market size, however in the last years the consumption of those products falling in the functional foods category has increased despite Italy represents a reference country for the Mediterranean food model (23).

Italian consumers, as European, pay increased attention to health-promoting foods. In fact, despite the actual period of economic crisis, the most important factors influencing the Italian consumer product choice are the qualitative and healthy value, than the brand, and only in the third position the cost, following the increasing interest towards the food functional aspects (Nielsen Consumer Confidence Survey).

Several mid- and long-term developments in society, as well as socio-demographic trends are in favour of functional foods, so that it can be assumed that functional foods represent a sustainable category in the food market (24-25).

According to Just-food estimates, functional foods market presents great expansion potentialities especially in the European Union countries, since several regulations and directives on functional foods are currently being developed.

The increased consumer attention towards the connection between health, longevity and diet led to the formation of an increasingly demanding public, who requires products always different and with time varying features (26).

Therefore, functional food means an extremely dynamic market in which industries rapidly adapt their supply to demand; for that reason, the development systematic consumptions monitoring.

It should also be considered, that functional foods are sold at higher prices, thus contain larger profit margins than conventional foods, which obviously make the sector attractive for the players in the supply chain.

Against these advantages, the development of functional food market is quite complex, expensive and risky and it requires significant research efforts (27-28).

It involves identifying functional compounds and assessing their physiological effects, developing a suitable food matrix, taking into account bio-availability and potential changes during processing and food preparation, consumer education, and clinical trials on product efficacy in order to gain approval for health-enhancing marketing claims.

Conclusion

In the last decades, the change in the society lifestyles and the health cost rising have meant that the principle of “prevention is better than cure” has become a “must” and the food concept has evolved from simple nutrient to health-promoting factor.

Health institutions promote the adoption of eating habits capable of avoiding or limiting some diseases, cardiovascular and obesity particularly, inducing consumers to sale product according to these needs.

Therefore, new products formulation will be determined with the identification of new ingredients and their producing effects, for example the vitamin K for the osteoporosis prevention or the lycopene for the prostate cancer prevention.

These products provide consumers a modern way to follow a healthy lifestyle, which differs from the conventionally healthy diet defined by nutrition experts.

There is no doubt that functional foods generate one of the most promising and dynamically developing segments of food industry.

Processing industries should choose indeed whether to maintain product lines responding to the logic of competition only or to point to a new development prospective represented by the connection between scientific research and demand for wellness.

In practice the challenge will consist in the planning of a wide range of foods for daily consumption with functional features, i.e. foods integrated with specific ingredients, which can show health benefits. For this reason, the European and Italian food industry should point to research, innovation and training through the European Technological Platforms, involving all the “actors”: Federations, research Institutions, Financial Word, public authorities, industry operators, media and consumers.

In general, the attitude both to functional foods and to their consumers is positive and it represents, therefore, a sustainable trend in a multi-niche market.

Received September 28, 2009

Accepted November 30, 2009

REFERENCES

- (1) F. ADINOLFI, M. DE ROSA, "L'effetto della novità sui comportamenti di consumo: considerazioni teoriche e verifiche empiriche sui prodotti alimentari", *Rivista di Economia Agraria* 2002, 4, 733-758.
- (2) M.B. ROBERFROID, "An European consensus of scientific concepts of functional foods", *Nutrition* 2000, 16, 689-691.
- (3) L. LÄHTEENMAKI, "Consumers and functional foods", in T. Mattila-Sandholm & M. Saarela (Eds.), *Functional dairy products*. Cambridge: Woodhead Publication Ltd 2003.
- (4) REGULATION (EC) n. 258/97 of the European Parliament and of the Council of 27 January 1997 concerning novel foods and novel food ingredients.
- (5) REGULATION (EC) n. 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods.
- (6) G. HARDY, "Nutraceuticals and functional foods: Introduction and meaning", *Nutrition* 2000, 16, 688-697.
- (7) N.S. KWAK, D.J. JUKES, Functional foods. Part 1. "The development of a regulatory concept", *Food Control* 2001, 12, 99-107.
- (8) C. MARK-HERBERT, "Innovation of a new product category-Functional foods", *Technovation* 2004, 24, 713-719.
- (9) EUROPEAN COMMISSION. Functional food science in Europe (FUFOSE).
- (10) A.T. DIPLOK, P.J. AGGETT, M. ASHWELL, F. BORNET, E.B. FERN, M.B. ROBERFROID, "Scientific concepts of functional foods in Europe: Consensus document", *Journal of Nutrition* 1999, 81(suppl. 1), S1-S27.
- (11) P. COPPENS, M. FERNANDES DA SILVA, S. PETTMAN, "European regulations on nutraceuticals, dietary supplements and functional foods: A framework based on safety", *Toxicology* 2006, 221, 59-74.
- (12) "Functional Foods: Public Health Boon or 21st century quackery?" in International Comparison of Regulatory Requirements and Marketing Trends, *International Association of Food Organizations*, Washington, DC 1999.

-
- (13) S. ROSS, "Functional foods: The Food and Drug Administration perspective", *American Journal of Clinical Nutrition* 2000, 71, 1735S-1738S.
 - (14) M. NIVA, "All foods affect health: Understandings of functional foods and healthy eating among health-oriented Finns", *Appetite* 2007, 48(3), 384-393.
 - (15) D. JAGO, "Functional foods, market trends", *Functional Foods Symposium*, Amsterdam, 2009.
 - (16) A.E. SLOAN, "The top ten functional food trends", *Food Technology* 2000, 54, 33-62.
 - (17) A.E. SLOAN, "The top 10 functional food trends. The next generation", *Food Technology* 2002, 56, 32-57.
 - (18) A.E. SLOAN, "The top ten functional food trends", *Food Technology* 2004, 58, 28-51.
 - (19) L. KOTILAINEN, R. RAJALAHTI, C. RAGASA, E. PEHU, "Health enhancing foods: Opportunities for strengthening the sector in developing countries", *Agriculture and Rural Development Discussion* 2006, Paper 30.
 - (20) M.B. ROBERFROID, "Concepts and strategy of functional food science: The European perspective", *The American Journal of Clinical Nutrition* 2000, 71, S1660-S1664.
 - (21) NEWSFOOD, "Gli alimenti funzionali e nutraceutici", 2008, www.newsfood.com/?location=Italiano&item=46176
 - (22) M. MÄKINEN-AAKULA, "Trends in functional foods dairy market", in *Proceedings of the third functional food net meeting*, 2006.
 - (23) I. SIRÒ, E. KÀPOLNA, B. KÀPOLNA, A. LUGASI, "Functional food. Product development, marketing and consumer acceptance-A review", *Appetite* 2008, 51, 456-467.
 - (24) T. BECH-LARSEN, J. SCHOLDERER, "Functional foods in Europe: Consumer research, market experiences and regulatory aspects", *Trends in Food Science & Technology* 2007, 18, 231-234.
 - (25) P.J. JONES, S. JEW, "Functional food development: Concept to reality", *Trends in Food Science & Technology* 2007, 18, 387-390.

- (26) N. URALA, L. LÄHTEENMAKI, "Consumers' changing attitudes towards functional foods", *Food Quality and Preference* 2007, 18, 1-12.
- (27) E. VAN KLEEF, H.C.M. VAN TRIJP, P. LUNING, "Functional foods: Health claim food product compatibility and the impact of health claim framing on consumer evaluation", *Appetite* 2005, 44, 299-308.
- (28) E. VAN KLEEF, H.C.M. VAN TRIJP, P. LUNING, W.M.F. JONGEN, "Consumer oriented functional food development: How well do functional disciplines reflect the 'voice of the consumer'?", *Trends in Food Science & Technology* 2002, 13, 93-101.