UDK 664
Pregledni članak
Prihvaćeno za tisak: 12. svibnja 2012.

CONSUMER NEEDS FOR AFFORDABLE FOOD OF GOOD QUALITY

Serving consumer demands

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Summary

Food has a powerful impact on human physical, mental, emotional and spiritual well-being and this is reflected on in many new nutritional approaches.

Consumers expect a steady increase in quality, safety and diversity of food. Consumers' perception of food quality is a dinamic variable. It might focus on products, processes, process management or on management issues such as fairness in trade, working conditions, environmental consciousness, or the origin of products.

Despite the fact that food has never been safer, it seems that consumers are considerably uncertain, anxious and increasingly critical about the safety of their food.

Both growing demand for safer, healthier and higher food quality, and at consumers' concerns about global warming and environment protection necessiate a more intensive and closer collaboration of food scientists and technologists, engineers, and others, in order to use information from the fields of biophysics, informatics, nanotechnology, nutritiogenomics, and medicine, to address all social and economic challenges.

Understanding consumer behaviour as a major factor in the competitiveness of food industry and the impact of food on health, and well-being, the focus should be placed on consumers' perception and attitudes towards food, understanding of societal trends, and identification of food choise determinants and consumer access to food.

Most of the food available to the consumers are both processed and packed. To ensure a high level of protection of human health and consumers' interests in relation to food, the basic task should be to provide an integrated approach ''from fork to farm'' covering all sectors of the food chain, including feed production, primary production, food processing, transport, and retail sale.

The final goals to be required refered to new flexible enterprise relationships that will connect further food products and process development with consumers' needs, based on research results obtained in respective fundamental disciplines.

Keywords: Consumer, food quality and safety, nutrition, well-being

1. INTRODUCTION

Nowadays we are witnesses of an increasing demand for, so called, health-promoting foods. Diet and health are growing priorities and consumers are becoming more knowledgeable, as a consequence of scientists' ability to understand some connections between nutritients, foods and physiological function [1].

The trend towards healthier eating in recent years has increased consumer demand for more detailed, accurate and accessible information, principally on food package labels, and covering nutritional content, ingredients and claims, as well as aspects relating to food safety, such as expiry dates, storage and cooking instructions [2]. The general level of formal nutrition education is widely regarded as inadequate. Knowledge of nutritional science and its correct understanding and adoption in practice can positively enhance well-being and possibly extend one's lifespan, whereas ignorance or rejection of it can be detrimental to health. Studies of nutritional understanding are seen as part of the wider domain of the public understanding of science [3].

Understanding consumer needs for affordable food of good quality, and the impact of food on the health, and well-being, and diversity as well as behaviour, attitudes and knowledge of consumers is of utmost importance to policu making on food, understanding societal trends, guiding regulation, informing new food development, identifying determinants of food choise and consumer access to food, and directing other activities [4].

Food and nutrition have become topics both in academic and in an increasingly number of debates and political discourses the recent years. Global production and distribution of cheap and fat food and sugar drinks influence not only what people eat across the world, but also how food consumption is practiced as a cultural phenomenon.

Food industry professionals realize that as more and more consumers amend their diets to improve health, food manufacturers must keep current on the issues and new technologies that are shaping the landscape of the wellness marketplace [5].

There is need to better understand the drivers of consumer behaviour towards food purchase and consumption, in addition to take into account how consumer attitudes are forme in the context of agriculture and food and how trust in the food supply chain can be maintained and reinforced. It is important to understand how the consumer attitudes vary with age and other social parameters, and how messages about healthy diet can be successfully conveyed to the population [4].

Taking all in consideration for food science, food technology and food industries there are more and more challenges ahead due to the trends in nutrition and on food market.

2. EXPECTATIONS FROM FOOD

Here will be given some aspects concerning our expectations from food.

Food Safety

We live in a highly technical society, and every day we are influenced by technical developments and concepts. Food safety and control measures for prevention of food-borne diseases continue to be one of the major goals. Scientifically trained individuals must do a better job of explaining scientific developments to consumers in our society. We have to be concerned especially about consumers' perception of *food safety*.

Food safety is often compared with so called ''food defens'', with main differences being that in food defense the role of law enforcement and the agents and scenarios are ''outside the box''. Even an ineffective attack (in terms of public health) could have large economic and psychological impact. Areas of focus include vulnerability assessments, industry guidance, strategic approach to imports, research, emergency preparedness, and response. Newertheles, the role of media (in most cases the lack) attention is important to deliver the informations on food outbreaks on the proper way, and in time [6].

For food safety of the highest importance are:

- Control measures for prevention of food-borne diseases, antibiotics and hormones in food products, etc.,
- Design of methods (i.e. rapid detection methods) and instrumentation for food safety and biosecurity (nano-sensors, nanotracers…formulation, packaging…),
- Regulatory Control and Enforcement, and other.

To ensure a high level of protection of human health and consumers' interests in relation to food, the basic task should be towards an integrated approach ''from fork to farm'' (or ''farm–to–table'') covering all sectors of the food chain, including feed production, primary production, food processing, transport, and retail sale [7].

Food quality

As consumers expect a steady increase in quality and diversity of food, the goal of food producers is to produce food of good quality and to maintain it. The

concept of *food quality* has changed significantly over the years and will continue to do so. Food quality or the value of a food should be determined within the context of the total diet because classifying foods as ''good'' or ''bad'' may foster unhealthy eating behaviors [8]. It is of big importance that each state establish quality assurance policies and procedures applicable to the procurement of food by interested parties.

Functional food

Taking into consideration physiological functions of some food constituents, and their nutritional implications, recently focus is on *functional food* (foods or food products marketed with the message of a benefit to health). A wide variety of food products are or will, in the future, be characterised as functional food with a variety of components, some of them classified as nutrients, affecting a variety of body functions relevant to either a state of well-being and health and/or to the reduction in risk of a disease. Thus no simple, universally accepted definition of functional food exists. Especially in Europe, where even the common term ''dietary fibre'' has no consensual definition, it would be unrealistic to try to produce such a definition for something as new and diverse as functional food. Functional food has thus to be understood as a concept. Moreover, if it is ''function driven'' rather than ''product driven'', the concept is likely to be more universal and not too much influenced by local characteristics or cultural traditions [9].

Convenience

Besides mentioned, food marketers and companies have focused on *convenience* (as a consumer value and product benefit and as an increasing concumer need), and food technologists have been key in this effort. The most offten definition of convenience is due to meal preparation. Time savings as a type of currency could be quantified in ''value-added'' terms – quick, instant, minute and ready (*Easy to prepare food*: packaged foods, frozen, prepared, store-made precooked meals, ready-to-cook, fast-food take-out, be available quickly in a ready-to-eat form, etc.). Since convenience serves different purposes developers and marketers will be able to tailor products and messages to specific target groups, helping them in their quest to serve up the comfort, security, and love for meal preparation [10]. Consumer demand for fresh, and in the same time convenient, food which can be achieved through production of *minimally processed ready-to-eat productss* (rapidly growing segment in food processing industry), but in the same time with *maximized freshness* and *long shelf life with high quality* (and fresh appearance).

Healtfulness and disease prevention

Consumers are expecting that food *increase healtfulness and prevent disease* (i.e. more vegeterian and cereal-based diet, low sugar, low fat) also to *build functional properties* (and how to preserve them). New food should be with *improved performance*, *designed with better sensorial characteristics*, and *be appetizing* (tasty).

Demographic change

Changes in society and demographic trends, more and more there is need for *cullturally more diverse food* (such as etnic dishes), *designed for the demographic changes* (increasing elderly population, increasing children population, increasing participation of women in the workforce), and *individually tailored* (personalized nutrition).

Nevertheles, foods should be delivered *to specific genomic targets, packaged functionally* and *attractively, designed for supermarkets, restaurants and institutions, inexpensive,* manufactured at *low cost* with *high productivity* and *quality.*

Taking all account, during food production demand is for *minimum dispozable waste* (reduction of effluents/emissions, biodegradable), etc.

3. FOOD MANUFACTURING

Food manufacturers and processors are constantly asking how formulation changes, different suplier's ingredients, packaging, ambient storage, and transportation affect their products. For that reason for manufacturing (food processing) is very important to *manage with raw materials* (due to raw material of different/certain origin, variability of raw material with season, shortage and increasing costs, etc.) and to *convert perishable commodities into stable products*.

Developing and implementing environmentally friendly initiatives and sourcing sustainable raw material and ingredients are not always easy. [11]. Particular attention must be towards *product/process development* (reengineering of products/processes) due to raw material diversity.

To be able to have successful food production, during processing it is needed to *improve line operations* and to build *in-line sensing.*

Manufacturers vision is to improve *food packaging materials, design and methods* with packaging *nutrition labeling* (need for standards for labeling), and food products with prolonged *shelf-life* in order to preserve the safety of the contained food product.

In order to fulfill *food safety requirements* advanced monitoring and control systems in food processing are very important to be introduced (HACCP).

In addition, for the most food producers is very important to introduce *labour saving devices* in their production, as well as *efficient line layout*

For successful food production it is of utmost importance to have all relevant *resources*. To be able to fulfill all needs of the modern market and to be effective *information technologies* and *computerisation* are also crucial.

For the better understanding of all processes in the manufacturing process there is need for personnel *supervisor training*, *technical assistance*, *trade show assistance* (production which is socially just and environmentaly sound, fair trade standards, etc.), and *workforce recovery* (safe and health working conditions) [12].

Nowdays, due to lacking of natural resaurces, as well as climate changes, there is need for *wastewater/waste recovery* (water and waste management - recycling and reusing water/food by-products and organic food waste as a source of energy), savings of *energy* (efficient energy utilisation, energy costs reduction, renewable energy) and *environment* protection (environmentally friendly production, reduction of effluents/emissions) [11].

Improving Food and Process Development

As a result of trends registered during several last decades, many improved, novel and alternative methods and procedures of *food preservation* and *processing* have been introduced (nonthermal, minimal processing, MAP, use of high pressure, pulsed electric field and light, oscillating magnetic field, ultrasound, liquid and supercritical gasses…).

There is a need to evolve and redesign traditional unit processes and technologies by applying innovations and *novel techniques*, or procedures (as well as new ingredients).

Consequence of changing consumer needs – a necessity facing food designers to reverse their mode of operation from supply-orientated into demand-orientated. This process is known as ''chain reversal'' or *consumer-driven food product development* (Consumer-orientated approach).

Promising methodologies to improve the success rate of product development are based on structured techniques, starting from consumer wishes, like Quality Function Deployment (QFD).

Taking all in consideration for food science, food technology and food industries there are more and more challenges ahead due to the trends in nutrition and on food market [13].

As the science related to food science has become more complex and as the expectations of consumers have become more sophistificated, the translation of new research findings into applications has become more challenging, and

the need for a proactive approach to communicating food science information is more evident. Particular attention must be taken in applying innovations by using *cross-technology transfer* and *basic research* (Fig. 1 and 2.) [1].

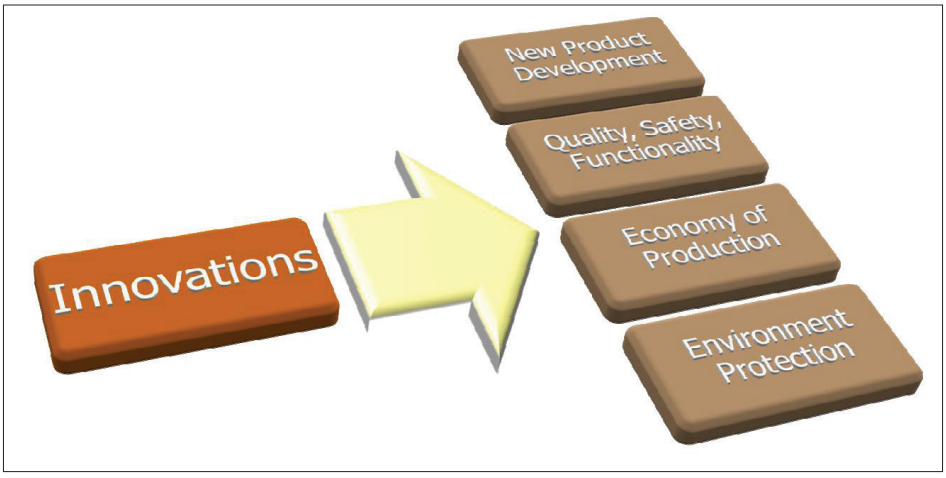

Fig. 1. Objectives of Innovations in Agricultural and Food Production Sector
Sl. 1. Ciljevi inovacija u sektoru poljoprivrede i proizvodnji hrane

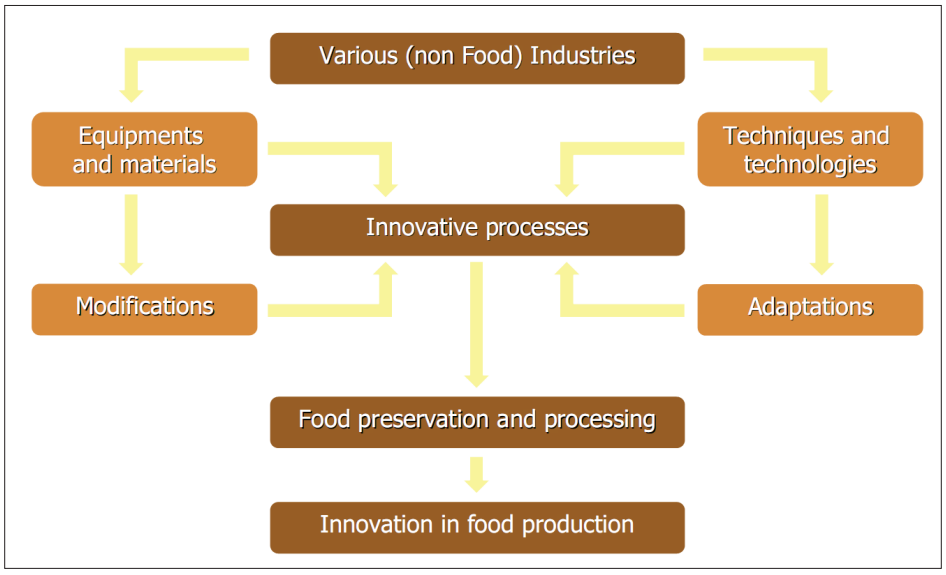

Fig. 2. Innovations and Cross-Industry Technology Transfer
Sl. 2. Inovacije i prijenos tehnologija u industriju

Science and technologies

Better public understanding of science can be major element in promoting prosperity of society, in raising the quality of public and private decision-making, and in enriching the life of the individual. The public are exposed to all sorts of scientific issues which they need to understand, in order to reach the right decisions. One of these issues is the choice of diet [3].

Science and technologies which should play an increasing role in food science and engeneering are:

- ***Molecular Biology and Biotechnology***,
- ***The identification of the human genome and food gene interactions – genomic sciences*** (regulation of biochemical processes in the human body with food; genes responsible for disease and taste perception; for obesity and their regulation with food),
- ***Combinatorial chemistry and computation chemistry*** (with impact on ingredient functionality, food ingredient selection, etc.),
- ***New structure identification technologies and structure manipulation and probing technologies*** (nanotechnology, ultrasound, etc.),
- ***Novel food preservation technologies*** **(**with multiple sources of energy and particular hybrid food technologies),
- ***Information Technologies and Web***,
- ***Computation sciences*** (with impact on design of food processing and product quality), and
- ***Other*** [12].

4. NEW EXPERTISE TO RESPOND TO CHANGING NEEDS

For food industry is very important that scientific results can be used more rapidly. Nowdays there are many fields of interest for further research and development such as:

- ***Plants for the Future***,
- ***Animal Breeding***,
- ***Materials science*** (intelligent packaging, use of antimicrobial and nanocomposite films, oxygen-sensing patches) in particular new organization of food using nanotechnology, micro devices, new functional materials (nanocomposites-nanostructuring, nanotubes and membranes…),
- ***Micro-*** and ***nanoscale processing***,
- ***Product development,***
- ***Non-termal processing*** (minimal invasive techniques),
- ***New imaging techniques***,

- ***Biomarkers for wellness***,
- ***Nanoscience for health***,
- ***Food chemistry with emphasis on combinatorial chemistry***,
- ***Food biotechnology to improve food functionality*** (nutraceutical value, flavour, texture, stability),
- ***Developing value-added food products*** (with superior quality, convenience, availability, affordability, and for specific target population),
- ***Microbial molecular biology/food safety***,
- ***Nutrigenomics***,
- ***Proteomics***,
- ***Epigenetics***,
- ***Bioinformatics***.

Recently, demand is on developing *value-added food products* with superior quality, convenience, availability and affordability through producing *tailor-made food products* and improving process- and packaging design and process control [14].

5. SUSTAINABILITY

Sustainability become very important issue in all areas of interest and activities of the human kind. Growing awareness of environmental issues is affecting our lifestyles. Seeking to reduce energy costs and to protect the environment, companies are exploring "green" manufacturing practices (eco-friendly products, eco-friendly packaging, organic and fair treatment of employees and suppliers), installing techologies to help to reduce energy usage and costs and sustainable/renewable packaging (and less material) applications, or engineering innovative processing methods.

Choosing raw materials that are sourced or produced in ways that minimally affect the environment is a step that companies can take to become "green". If consumers continue to purchase products that are promoted as eco-friendly or sustainable, the companies will continue to produce more of these products as well as invest in corporate sustainable/environmental practices [11].

Food sustainable production can be related to:

- ***primary food production*** (agriculture that does not irreversibly damage the land, minimize soil erosion, balance the amount of water used in irrigation with the amount that would be replenished naturally and in the same time improves or enhances the lives of food producers and members of their communities and society as a whole),

- ***food processing*** (technologies to help reduce energy usage and costs and use of engineering innovative processing methods),
- ***packaging*** (recycled, biodegradable, redesigned packaging and the use of less packaging material), and
- ***distribution*** (affordable and safe food supply with low prices).

A doubling in global food demand projected for the next 40-50 years poses huge challenges for the sustainability both of food production and of terrestrial and aquatic ecosystems and the service they provide to society. By 2050, global population is projected to be 50 % larger than at present [15]. Some goals to achieve sustainable food production are:

- Understanding of the sustainability of food production and supply,
- Research on scenarios of future food production and supply,
- Developing sustainable processing, packaging and distribution,
- Developing and implementing sustainable primary food production,
- Understanding consumers and their behaviour regarding sustainable food production.

Doubling food production and sustaining food production at this level are major chalanges. Further increases in agricultural output are essential for global political and and social stability and equity [15].

6. FOOD CHAIN MANAGEMENT

The food sector as a whole is facing with many challenges which cannot be solved by any individual actor but all that represent the whole food chain such as suppliers, primary producers, processors, manufacturers, and retailers. Food chain management needs an innovations due to changing lifestyles of consumers (consumers demands), and global increases in food consumption by technological changes, changes in information and communication systems [16].

Managing the food chain is very important in stabilizing markets and there is need for:

- Identification of relevant possible future scenarios,
- Stabilizing markets and supporting food chain dynamics,
- Improving the innovation potential of the food chain,
- Supporting competitiveness through integration,
- Participation of small producers in the emerging complex food chain operations,
- Integrating food chain management and the consumer.

7. ENVIRONMENT PROTECTION

Many businesses are responding by installing technologies to help to reduce energy usage and costs and to be environmentally friendly. The detrimental environmental impacts of agricultural practices are costs that are typically unmeasured and often do not influence farmer or societal choices about production methods.

Consumers are confronted with a barrage of advertising from companies touting their ''green'' products and reducing their carbon footprint or telling how global warming can be reduced.

Consumers have an increased desire to control things that are within their grasp.

Consumers' persuit of environmentally friendly products is an attempt to reassure themselves that they have some measure of control [11].

8. TEACHING AND TRAINING

New challenges facing food scientists, technologists and food producers could be overcome only by using new achievments in science and engineering, as well as by renewing educational programes and curricula!

Food industry cannot do all by itself! For that reason there is need for education of professionals and consumers as well.

Educating professionals

Education in food science and knowledge of nutritional science and their correct understanding and adoption in practice can positively enhance well-being and possibly one's lifespan, whereas ignorance or rejection of it can be detrimental to health. In this respect it differs from most other applications of scientific knowledge.

The both, food and higher educational systems are in a period of great change. To rise the challenges and opportunities these changes will require extraordinary leadership in all components of food systems.

Educating consumers

Teaching and educating consumers to make wise food choices in the context of the total diet is not a simple process.

In most situations, nutrition message are more effective when focused on positive ways to make healthful food choices over time, rather than individual foods to be avoided.

Food and nutrition professionals have a responsibility to communicate unbiased food and nutrition information that is culturally sensitive, scientifically accurate, medically appropriate, and feasible for the consumers [17].

Educational programs for food professionals and consumers need involvement, input, and support from all professionals associated with food science in academia, industry and government.

9. DEMOGRAPHIC CHANGES

Demographic changes are creating unprecedented demand for instant preparation, little indulgences, budget gourmet items, and convenient take – to – work foods. Growing ethnic diversity will increase demand for authentic ethnic and specialty foods. Decreasing family sizes, increasing number of house-holds, to whom time is ever-more important than money, will drive the need for convenience and speed to an all-time high [18].

Consumer product markets have begun targeting workers that are on the job every day and have less time to pick up lunch or prepare it at home.

As consumers' everyday lives got busier, foods formulated with specific convenience benefits provided a new kind of value for meal-preparation needs. Time savings as a type of currency entered the equation and could be quantified in "value-added" terms – *quik, instant, minute,* and *ready* became product and brand descriptors to help connect consumers with the need to define convenience in terms of time [10]. For that reason there are development in foodservice sector with different *foodservice locations* such as *Quick-service restaurants (QSR), Full-service restaurants (FSR), Fast-food restaurants*, and *services* such as *Microwevable, frozen/refrigerated "brown-bag" meals*, *Food delivery services, Carryout from casual restaurants*, etc.

Among mentioned **type of households** will force manufacturers to considere about production for:

- ***One-person households*** (Singles are the most likely to use food delivery service or to eat out more often and cook less),
- ***Two-person households,***
- ***Empty Nesters*** (married couples with no children at home – demand for flexible portion packaging and servings for one or two),
- ***Two-parent household with children,***
- ***Single-parents*** (mother of father with children – demand for flexible portion packaging and servings for one or two) [18].

Income value

Nowdays, income value is of big importance, and food producers have to take it into account. Many households are struggling to make ends meet, creating unprecedented opportunities for "budget" or "extreme value" (very discounted) foods and beverages.

Generally, cash concerned there are:
Lower-income households (purchases canned meats and shelf-stable meals),
Lower middle-income households,
Middle-income households,
Single-parent household (continues to rise),
Joung family households (lowest spenderson self-indulgent categories such as alcoholic drinks and snacks),
Budget-minded shoppers (growing numbers), etc..

Prediction is that over the longer time, the economic crunch will most affect the younger generations [18].
Besides this categorization there are others, too, such as consumers by age.

10. PLANS TO REACT TO NEW DIET TRENDS AND ISSUES

Changes in eating habits and demand for improved quality food create opportunities for:

- **New product ideas** (must consider portability, prepration ease/time, and household size),
- **Product formulation** (Health-concerned demographics have broadened, making health and wellness key factors in product formulation for all ages as health clinics move into stores.),
- **Balanced nutrition** (very important for food (meal) selection),
- **Marketers** (must put plans in place to react to new diet trends and issues),
- **Sources of nutritional information - focus on media attention –** should be adequate, acessible, correct, clear, and unconfusing information.

11. CONCLUSION

As a consequence of the emerging knowledge of *food – nutrition – health* relationship, and of an increasing consumer demand for *health promoting food*, there is a continuous need and requirement towards improving food products, as well as introducing new ones by applying innovations deriving from cross-technology transfer and basic research.

Important issues are to be addressed with knowledge generated through basic and applied research in different disciplines.

The final goal of food scientists' activity, in the future, is to connect further food products and process development with consumers physological needs, based on research results obtained in respective fundamental disciplines.

Complexity of objectives that have to be achieved impose a new approach based on close collaboration of scientists and engineers from different scientific and technological areas.

New challenges facing food scientists, technologists and food producers could be overcome only by using new achievements in science and engineering, as well as by renewing educational programmes and curricula.

Regional, national and cultural differences between consumers must be recognised and taken into account for effective communication and education programmes.

A goal of all profesionals should be long-range vision "to ensure a safe and abundant food supply contributing to healthier people everywhere."

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Potrebe potrošača za dostupnom hranom dobre kakvoće

Sažetak

Hrana ima veliki utjecaj na fizičko, mentalno, emocionalno i duhovno stanje ljudi a to se odražava u mnogim novim pristupima prehrani.

Konzumenti očekuju siguran rast kvalitete, sigurnosti i različitosti hrane. Predodžba konzumenata o kvaliteti hrane je dinamična. Ona može biti fokusirana (usredotočena) na proizvode, procese, upravljanje procesom ili na pitanja upravljanja kao što su nepristranost na tržištu, radni uvjeti, briga za okoliš, ili podrijetlo proizvoda.

Unatoč činjenici da hrana nikada nije bila sigurnija, čini se da su konzumenti (potrošači) znakovito sumnjičavi, zabrinuti i sve više kritični kada je u pitanju sigurnost hrane.

Rastući zahtjev za sigurnijom, ''zdravijom'' i hranom najviše kvalitete, kao i briga potrošača za globalno zatopljenje i zaštitu okoliša zahtijeva intenzivniju i čvršću suradnju znanstvenika u području hrane, tehnologa, inženjera i drugih, s ciljem da se upotrijebe informacije iz područja biofizike, informatike, nanotehnologije, nutricionizma, medicine, kako bi se odgovorilo socijalnim i ekonomskim izazovima.

Razumijevanjem ponašanja konzumenta (potrošača), kao glavnog čimbenika u konkurentskoj prehrambenoj industriji i utjecaja hrane na zdravlje i blagostanje, fokus bi se trebao usmjeriti ka percepciji ponašanja potrošača prema hrani, razumijevanju socijalnih trendova i identifikaciji determinanti za izbor hrane te dostupnosti hrane potrošačima.

Većina hrane, dostupne potrošačima, je prerađena i upakirana. Da bi se osiguralo zdravlje potrošača kao i potrebe potrošača za hranom, osnovna zadaća morala bi biti da se osigura integrirani (sveobuhvatni) pristup ''od vilice do farme'' čime bi se pokrili svi sektori lanca hrane, uključujući proizvodnju hrane za stoku, primarne proizvodnje, prerade hrane, transport i prodaja.

Konačni ciljevi koji su potrebni odnose se na nove fleksibilne odnose unutar poduzeća koji će povezati buduće prehrambene proizvode i razvoj procesa s potrebama potrošača, baziranih na rezultatima istraživanja postignutih u odgovarajućim fundamentalnim disciplinama.

Ključne riječi: potrošač, kvaliteta i sigurnost hrane, prehrana, blagostanje

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