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Journal of Cancer Research and Cellular Therapeutics

Fahim A. Shaltout*

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Review Article

Up to date data base about using of Meat as a functional food

Fahim A. Shaltout

Food Control, Faculty of Veterinary Medicine, Benha University, Egypt.

***Corresponding Author:** Fahim A. Shaltout, Food Control, Faculty of Veterinary Medicine, Benha University, Egypt.

Received Date: November 15, 2024; **Accepted Date:** November 22, 2024; **Published Date:** November 29, 2024

Citation: Fahim A. Shaltout, (2024), Up to date data base about using of Meat as a functional food, *J. Cancer Research and Cellular Therapeutics*. 8(7); DOI:10.31579/2640-1053/217

Abstract

A number of studies have attempted to show how the addition of the various ingredients, the vegetables, the fibres, the extracts, as well as the removal of the fats and the additives could transform the conventional perception of the meat and the meat products types into one of healthy living. This article examines potential future trends in the agrofood industry and provides an updated version of recent studies on the subject. It analyses the changes that have taken place in the traditional meat industry as the agrofood industry's global forces increasingly focus it on the development and manufacturing of the functional foods types.

Keywords: ingredients; vegetables; fibres; extracts; traditional meat industry; consumer demand; agrofood.

Introduction

The trend toward functional foods types has led to the publication of several articles describing studies of the effects of including 1or more ingredients with functional properties in various types of food, within which the meat and the meat products deserve special attention. The object of including functional ingredients in the case of the meat is not only concerned with providing it with certain desirable properties but an attempt to change its image in these health-conscious days. The meat industry is one of the most important in the world and, whether as a result of the consumer demand or because of the ferocious competition in the industry, research into new products is continuous. However, such research and the launch of new products is directed at providing healthy alternatives to what has frequently been accused of causing a variety of pathologies (1-6).

This unfortunate image derives mainly from the content of fat, saturated fatty acids, and cholesterol and their association with cardiovascular diseases, some types of cancer, obesity, and so forth. Regarding obesity, it is very important to understand how the meat or the meat products affects biological and physiological mechanisms of appetite, satiety, and long-term behavior. The meat and the meat products types show highly satiating characteristics and, in this respect, the functional foods types could be a food-related solution because these types of products could be designed to be less calorifically dense and while remaining more highly satiating and tasty. In this way, the food types industry in general, the meat and related products types industry in particular, could contribute to making lives easier and more active. The meat is associated with cholesterol, and although it is now accepted that the dietary intake of cholesterol has little bearing on the plasma cholesterol, for consumers this is another negative influence on the meat's health image (7-12).

In some cases, the consumer is confused by multiple messages from multiple sources, public skepticism about expert opinion, the public misunderstanding of reports on scientific findings and results, increased media coverage accompanied by the recommendations for corporate marketing strategies and the health claims, and competing real-life and lifestyle demands. Furthermore, the food packaging could have a very important influence on the food types intake. The underlying idea behind functional food is to reduce the prevalence of chronic diseases by curbing the consumption of habitually consumed foods. The formulation of foods types according to the beneficial effects that their non-nutritional ingredients may have for the consumer has become an area of great interest for the large food types companies, including the meat sector (13-18). Although there is no exact definition of what a functional food is and many consider that it is a concept still under development, among the most widely accepted definition from a European point of view is that mentioned, namely that "a food may be considered functional if it contains a component (be it nutrient or not) with a selective effect on one or various functions of the organism, whose positive effects justify that it can be regarded as functional (physiological) or even healthy." A food can be regarded as functional if it is satisfactorily demonstrated to beneficially affect 1 or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved health or well-being and/or to a reduction in the risk of disease. A functional food must remain food and it must demonstrate its effects in amounts that can normally be expected to be consumed in the diet: it is not a pill or a capsule, but part of the normal food pattern. European consumers are more critical and less unconditional than Americans with this type of product because Europeans have recently suffered a sequence of food safety scares. Among the countries in the world, perception is very different; for example, in Denmark, consumers are very suspicious of

functional foods types, which they judge as "unnatural and impure" (19-24).

As far as meat is concerned, the modifications to which it may be subjected to confer functional properties on it are based on modifications to the feed an animal receives or on postmortem manipulation of the carcass. By the 1st means, the lipid, the fatty acid, and vitamin E content can be modified, whereas by the 2nd, fat can be removed by mechanical processes. Regarding the meat products types, efforts are mainly directed toward their reformulation by modifying the lipid and the fatty acid content, and/or by adding a series of functional ingredients (the fiber, the vegetal proteins, the monounsaturated or the polyunsaturated fatty acids, the vitamins, calcium, the phytochemicals, and so forth). The meat and the meat products types are essential for a balanced diet, although it must be remembered that they are susceptible to modifications to give them a "healthier" appearance (25-30).

The object of this article is to evaluate the effect of adding the func-tional ingredients on the physical, chemical, and sensory characteristics of foods types, especially the meat and its related products types, as understood from recently published scientific articles. Functional modifications in the meat and the meat products types The meat and the meat products types are essential in the diet of developed countries. Their principal components, besides water, are proteins and fats, with a substantial contribution of vitamins and minerals of a high degree of bioavailability. Both the meat and its associated products types can be modified by adding the ingredients considered beneficial for the health or by eliminating or reducing the components that are considered harmful. In this way, a series of the foods types can be obtained which, without altering their base, are considered "healthy (31- 36)."

The Modification of the fatty acid and cholesterol levels in the meat

The meat is in a major source of fat in the diet, especially of saturated fatty acids (SFA), which have been implicated in diseases associated with modern life, especially in developed countries. The ratio of n- 6: n-3 polyunsaturated fatty acids (PUFA) is a risk factor in cancers and coronary heart disease, especially the formation of blood clots leading to a heart attack. Levels of n-3 PUFA in pigs fed a linseed diet produced higher levels of thiobarbituric acid reactive substances (TBARS) after conditioning for 10 days followed by simulated retail display for a further 7 days, although the display period had no impact on the sensorial characteristics such as muscle color (saturation) (37-42).

The selection of breeds and genetic lines within breeds, changes in animal feeding practices, including some feed additives (probiotics, antibiotics, and so forth), and intervention in animal metabolism (anabolic implants, -agonist, growth hormone, etc.) are the main tools used to achieve a reduction in carcass fat content, although many such practices are not authorized in the European Union. Compared unweaned lambs and lambs weaned at 40 d of age, fattened at pasture and slaughtered at 28 kg live weight, to observe the effect on the meat quality and fatty acid composition, the weaning status was seen to affect the fatness and quality characteristics of the meat (of lambs raised at pasture) more than the type of feed. A further decrease in the intramuscular fat content would decrease the meat quality attributes, especially juiciness and flavor, which are already impaired in some cases. Variations in the fatty acid composition have an important effect on firmness or softness of the fat in meat, especially the subcutaneous and the intermuscular (carcass) fats but the intramuscular (the marbling) fat (43-48).

The effect of fatty acids on the meat shelf life is explained by the propensity of unsaturated fatty acids to oxidise, leading to the development of the rancidity as display times increases. Changes in fatty acid composition have not been directly linked to changes in myoglobin oxidation and muscle color in many of the pork studies. In the studies of the rabbit meat, confirmed that meat enrichment in n- 3 PUFA did not cause any increase in the oxidation level. The -linolenic acid–vitamin E diet favored the accumulation of long chain polyunsaturated n-3 in the meat and improved its oxidative stability and consequently its nutritional value. in studies about feeding linseed to increase the n-3 PUFA in pork meat, confirmed the potential of pork to supply valuable n-3 PUFA to the human diet, finding that it may be readily manipulated to increase the concentrations. The conjugated linoleic acid (CLA) has been recognized as having anticarcinogenic and antioxidative properties in several animal models. The concentration of CLA was significantly increased by the substitution of fat. Storage for 14 d had little effect on the CLA concentration in beef patties. Substituted CLA sources for the fat improved the color stability possibly by inhibition of the lipid oxidation and the oxymioglobin oxidation (49- 54).

The Addition of the vegetal oils to the meat products types

The olive oil is the most monounsaturated vegetable oil. It has a high biological value, and its consumption is related to a decreased risk of the heart disease and the breast cancer. The vegetable oils have been used as partial substitutes of the pork backfat in the low-fat frankfurters and other types of the cooked product giving rise to products types with more adequate fatty acid profiles and cholesterol levels than the traditional ones. The studies concerning the use of olive oil to replace (0% to 100%) the pork backfat for the production of the low-fat frankfurters, The higher levels of the olive oil had the lowest acceptability, although the color attributes were unaffected. The manufactured traditional Spanish sausage, replacing 0% to 30% of pork backfat by the pre-emulsified olive oil. The oleic and linoleic acid levels increased and the cholesterol content was reduced, while the sensorial characteristics, (the texture and the color) were comparable with those of commercial products types. The results pointed to the possibility of replacing the pork backfat with the olive oil (up to 25%) to increase the nutritional status. The addition of the olive oil to sausages was more effective than using the vacuum-storing methods in avoiding the lipid oxidation during the storage and increased the monounsaturated fatty acids fraction (MUFA) (55-d 60).

The replacement of 20% pork backfat with the olive oil does not affect the weight losses and makes the sausages lighter in the color and more yellow. The product has an acceptable odor and taste but unacceptable appearance because of the intensively wrinkled surfaces and the development of casing the hardening. The replacement of 20% pork backfat by the olive oil in the high and reduced fat Greek sausages led to significant decrease in the oxidation process and significantly increased the MUFA content in "salami" products types, The partial substitution of the pork backfat by extra virgin olive oil did not substantially affect the chemical, the physical, and the sensory characteristics of the products types, with the exception of the water activity and the firmness. The addition of the extra virgin olive oil, which is rich in the unsaturated fatty acids, did not reduce the shelf life in the terms of lipid oxidation, probably due to the antioxidant effect of both the polyphenols and the tocopherols. The sensory analyses did not point to differences from the traditional formulation.

An alternative to using this vegetable oil, which has a high unsaturated fatty acid content and is liquid at room temperature, is to use the interesterified vegetable oils (IVOs). These oils can be used as a fat replacer to modify the fatty acid composition of the frankfurters and the Turkish type salami without any detrimental changes in the sensory characteristics. The produced frankfurters with IVOs prepared from the palm, the cottonseed, and the olive oils and found that replacing the beef fat (10%) with IVOs (60% to 100%) led to a significant increase in the oleic and the linoleic acid content and the PUFA: SFA ratio without any change in the appearance, the color, the texture, the flavor, or other sensory characteristics.

The addition of the high oleic sunflower oil to the low-fat frankfurters as a source of the monounsaturated fat. The resulting product was healthier due the higher contents of the unsaturated and the essential fatty acids, without any negative sensory characteristics. The Linseed oil is another

source of the fat. The substitution of the pork backfat with the linseed oil in the manufacture of the dry-fermented sausages decreased the n- 6:n-3 ratio (from 14.1 to 2.1) as a consequence of the increase in - linolenic acid, this had a relevant influence on the nutritional quality of the products types, without substantially modifying the flavor or the oxidation(61- 66).

The Addition of the soy

The Plant-derived proteins from the soybeans have been used in traditional comminuted meat products types (30% fat) as meat replacements. Soy proteins (flours, concentrates, and isolates) are more commonly used in processed meat products types for their functional properties and relatively low cost compared with lean meat.

Soy proteins have been incorporated in these products types for their water- binding and fat-binding ability, enhancement of emulsion stability, and increased yields. Soya protein lowers blood lipid levels compared with animal protein. The diets low in saturated fat and cholesterol that include 25 g soy protein per day may reduce the risk of heart disease. Intact soy (with isoflavones) has a greater effect on reducing low-density lipoprotein (LDL) and total cholesterol concentrations than extracted soy. Soy isoflavones include compounds such as daidzin, genistin, daidzein, and genistein. However, it has recently been recognized that the isoflavones contained in vegetable proteins may have a detrimental impact on mammals that consume the vegetable protein. The Soy oil contains approximately 0.2 g plant sterols per 100 g.

The Plant sterols and plant stanols are associated with lowering plasma LDL cholesterol at intakes of 2 to 3 g/day. The Soy has been described as being useful in the prevention and treatment of cancer, osteoporosis, and in the relief of menopausal symptoms. Some researches have studied the use of the soy derivates in meat products types. The addition of Soy protein isolates (SPI) (2.5%) to chorizo raw sausage and found that it prevented drip loss of vacuum-packaged chorizos during refrigerated storage and did not affect the organoleptic and microbiological properties during shelf life of 14 day (67-72).

Soy protein isolate has been added in low-fat bologna, too. characterized this product and concluded that SPI (2%) can be incorporated as fat replacer without any detrimental physicochemical and textural characteristics being noted in the product, except for color values. The addition of SPI did not seem to change the ultrastructure of the meat protein gel matrix, and no interactions were noted with meat proteins. In other studies by the same authors, 4.4% SPI resulted in a softer texture of low-fat bologna and did not affect the another chemical parameters (181-186).

incorporated thermally/enzymatically obtained soy protein isolates (2%) in pork frankfurters. They concluded that heat and enzyme-hydrolyzed soy proteins affected texture properties differently, the 1st improving hardness and 2nd reducing hardness, cohesiveness, and breaking strength. The replacement of pork backfat with soy oil has been studied. The addition of soy oil did not modify the percentage of water or protein and the pH in fermented sausages. With the addition of pre-emulsified soy oil, cholesterol hardly decreased and oxidation was not modified. Saturated and monounsaturated fatty acids decreased, and polyunsatutared increased due the significant increase in linoleic and - linolenic acids. In the texture profile analyses, the sensory analysis and color did not show significant differences from commercial products types (73-78).

Another product, soy protein concentrate mixed with carrageenan (0% to 3%), was investigated in comminuted scalded sausage. The addition favorably affected the water- holding capacity and thermal stability of the processed sausages regardless of the fat content. It did not improve the textural parameters, and no significant influence on color parameters was observed. Addition of natural extracts with antioxidant properties Lipid oxidation is one of the causes for the deterioration of meat and derivatives because their appearance determines the onset of a large number of undesirable changes in flavor, texture, and nutritional value. The rate of lipid oxidation can be effectively retarded by the use of antioxidants. Synthetic antioxidants were widely used in the meat industry, but consumer concerns over safety and toxicity pressed the food industry to find natural sources. Natural antioxidants extracted from plants such as rosemary, sage, tea, soybean, citrus peel, sesame seed, olives, carob pod, and grapes can be used as alternatives to the synthetic antioxidants because of their equivalent or greater effect on the inhibition of lipid oxidation. The human intake of green tea decreases total cholesterol, increases the high-density lipoprotein (HDL) fraction, and decreases lipoprotein oxidation (175-180).

The addition of tea catechins to cooked red meat and poultry, the addition at 300 mg/kg minced muscle significantly inhibited the pro-oxidative effect of NaCl and controlled lipid oxidation in cooked muscle patties. The high affinity of tea catechins for lipid bilayers of muscle and their radical scavenging abilities may provide a possible mechanism to explain the inhibition of lipid oxidation in cooked muscle food. The functional properties of raw and cooked pork patties with added irradiated green tea leaf extract was studied. This extract did not have negative effects on the physical and sensory properties and had beneficial biochemical properties; the researchers concluded that irradiated green tea extract powder can be used to add functional properties to pork patties. added irradiated, freeze-dried green tea to cooked pork patties. The results show that this ingredient had no negative effects on the physical and sensory properties. Lipid oxidation was lower and showed less cooking loss. The patties with added the green tea leaf extract had beneficial biochemical properties.

Another extract used in the meat products types is rosemary, from whose leaves a large number of phenolic compounds with antioxidant activities have been isolated. These include carnosol, carnosic acid, rosmanol, epirosmanol, isorosmanol, rosmarinic acid, rosmaridiphenol, and rosmariquinone. manufactured wiener sausages with this extract, and no lipid oxidation was observed in the product during long-term frozen storage. Wieners containing rosemary appeared to have slower rates of oxidation than those without antioxidant (79- 84).

Sodium chloride control

Due to the role of sodium in the development of hypertension in sodium-sensitive individuals, public health and regulatory author-ities have recommended a reduced dietary intake of sodium choride. However, intake still exceeds the nutritional recommendations in many countries.

The main source of the sodium chloride in the meat products types is salt (NaCl), and its reduction in the meat products types is an important goal for decreasing overall the dietary sodium. Because the salt contributes to water and fat binding in the meat products types, its reduction has an adverse effect on these parameters increasing cooking loss and weakening the texture (169,-174). Although the meat as such is relatively poor in the sodium, containing only 50 to 90 mg of the sodium per 100 g, the sodium content of the meat derivatives is much higher because of the the salt content, which may reach 2% in the heat-treated products types and as much as 6% in uncooked cured products types, in which drying (loss of moisture) increases the proportion even further. Estimates taking eating habits into account suggest that approximately 20% to 30% of the common salt intake comes from the meat and the meat derivatives. The physical and the sensory properties of the low-salt phosphate-free frankfurters and concluded that when the frankfurters were made without the phosphate, additional the nonmeat ingredients (modified tapioca starch, sodium citrate, and wheat bran) were needed when the salt contents was below 1.5%. Salt directly affects frying loss, water and fat binding, firmness, saltiness, and flavor intensity (85- 90).

The evaluation of the quality characteristics of low-salt bologna-type sausage manufactured with sodium citrate, carboxymethyl cellulose, and carrageenan. The results show that in low-salt sausages containing less

than 1.4% NaCl, the use of these ingredients decreased frying loss and increased saltiness, but the conclusion was that in low-salt sausages, no additive alone is recommended. In the same study, salt affected frying loss, firmness, saltiness, juiciness, and flavor intensity. calcium ascorbate as a potential partial substitute for NaCl in dry-fermented sausages, in which substitution caused higher acidification as a result of greater lactic acid bacteria development, probably due to the presence of calcium.

Partial replacement of NaCl by calcium ascorbate seems to be a viable way of decreasing sodium in dry-fermented sausages. It would imply enrichment in ascorbate and calcium with advantages from the nutritional point of view. The salt reduction affects *L**, *a**, and *b** CIELAB coordinates (Commission Internationale de l'Eclariage) and affects hardness, gumminess, and chewiness (91-96).

Addition of fish oils

Oils in the form of n-3 polyunsaturated fatty acids occur mainly in cold water fish, whereas n-6 polyunsaturated fatty acids come mainly from plants and saturated fatty acids from animal sources. Diets in which cold water fish such as mackerel (*Scomber scombrus*), salmon (*Salmo salar*), halibut (*Hippoglossus hippoglossus*), and trout *(Oncorhynchus mykiss)* are the main staple are associated with reduced incidence of coronary heart disease but an increased risk of hemorrhage (163-168).

Epidemiological, clinical, and biochemical studies have provided a great deal of evidence about the protective effect of n-3 polyunsaturated fatty acids against some common cancers such as the breast and the colon cancer, the rheumatoid arthritis, the inflammatory bowel diseases, and the cardiovascular diseases. The Levels of dietary fish oil and the dietary antioxidant significantly influence the n-3 fatty acid and the cholesterol content of the meat lipids types. The addition of fish oil (2% to 4%) to the diet of chickens used to make it, no significant differences were found in pH, cooking

yield and moisture, fat, protein, ash and cholesterol contents, and sensory quality. These frankfurters had higher contents of eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA), but a lower content of n-6 fatty acids. The manufactured salchichon using the backfat and the meat enriched in the polyunsaturated n-3 fatty acids and _-tocopherol, concludeing that it is possible to manufacture dry-fermented sausages enriched in n-3 PUFAs without the adverse effects on its composition, the lipid stability, the textural, and the sensory properties (97- 102).

Addition of vegetal products types

The Vegetables are the main ingredient of a range of the meat-free dishes and convenience products types such as the vegetable burgers, the vegetable based sausages, the vegetable grills, and the ready meals types. The attributes of vegetables include high fiber, low fat, and low energy density. Particular types of vegetables can be a good source of the vitamins including the vitamin C, the folic acid, other B vitamins, the vitamins E and K, the potassium, the dietary antioxidants such as the carotenoids and the flavonoids, and a range of other potentially beneficial phytochemicals. The Protein derivatives of vegetable origin have been used in the meat products types for technological purposes to reduce formulation costs, and they have even been used for their nutritional value. The use of wheat protein as a meat alternative is a relatively recent development. The protein is essentially made from gluten that has been processed and extruded to resemble the texture of the meat (157-162). The effect of adding different decorticated legume flours to the buffalo meat burgers and showed that the inclusion of the roasted black gram flour led to lower the thiobarbituric acid values before frying and found the burger organoleptically acceptable even after storage at –16 ± 2 °C for 4 mo. The Nuts provide high levels of protein. Several studies have demonstrated an inverse association between nut consumption and the risk of the cardiovascular diseases (CHD). Although nuts are high in the fat, they contain a high proportion of unsaturated fats, including monounsaturated fats, which can contribute a cholesterol-lowering effect when used to replace dietary fatty acids and/or carbohydrate. Walnuts, peanuts, and almonds are a source of _ the linolenic acid, as are mycoprotein and soya oil. The Nuts contain dietary fiber and various bioactive compounds such as plant sterols, which have cholesterol lowering properties.

The addition of walnuts affects the cooking properties, color, texture, and sensory attributes, making the product softer and providing it with better water-binding properties. Product morphology studies suggested that walnut interferes with the formation of protein network structures (103-108).

Addition of fiber

Epidemiological research has demonstrated a relationship between a diet containing an excess of the energy-dense foods types rich in fats and sugar and the emergence of a range of chronic diseases, including colon cancer, obesity, cardiovascular diseases, and several other disorders an increase in the level of dietary fiber in the daily diet has been recommended. The presence of fiber in the foods types produces a diminution in their caloric content (151-156). The Fiber is suitable for addition to meat products types and has previously been used in the cooked meat products types to increase the cooking yielddue to its water-binding and fat-binding properties and to improve texture. Various types of fiber have been studied alone or combined with other ingredients for formulations of the reduced-fat meat products types, largely ground and the restructured products types, and meat emulsions (109- 114). The Rye bran was used as a fat substitute in the production of the meatballs. Rye consumption has been reported to inhibit breast and colon tumor growth in animal models, to lower glucose response in diabetics, and to lower the risk of the death from the coronary heart disease. The addition of rye bran to the meatballs at the levels assayed (5% to 20%) improved their nutritional value and health benefits. The total trans fatty acid content was lower and the ratio of the total unsaturated fatty acids to total saturated fatty acids was higher in the samples with added rye bran. The same samples were lighter and yellower than the control samples. The authors concluded that this type of fiber can be used as dietary fiber source (115- 120). Another source of fiber is oat. Many of the characteristics of oat fiber such as its water-absorption capacity could potentially benefit products types such as fat-free frankfurters and low-fat bologna. Oat products types have achieved a very positive consumer image because of the health benefits that have been associated with their consumption. Oat was added to determine the effects on the quality characteristics of light bologna and fat-free frankfurters. Different types of oat fiber were used, high absorption (HA) or bleached oat (BL) fiber at levels up to 3%. The results indicated that the addition of both types of oat fiber produced greater yields and a lighter red color. Purge was reduced with oat fiber at 3%. Product hardness increased for bologna. It has been reported that oat bran and oat fiber provide the flavor, texture, and mouthfeel of fat in ground beef and pork sausages (121- 126). The components of dietary fiber include fructo-oligosaccharides (FOS), a generic name for all nondigestible oligosaccharides composed mainly of fructose. The effect of a short-chain FOS on cooked sausages. The addition did not affect the pH, aw or weight losses because the presence of soluble dietary fiber (SDF) leads to a compact gel structure and therefore prevents proteins from retaining the water. The energy values decreased from 279 kcal/100 g in the conventional control to 187 kcal/100 g in the reduced-fat sausages with 12% added fiber at 12% SDF. The hardness of the samples with SDF was lower, and the overall acceptability in the sensory analysis was higher in samples with 12% SDF. Another SDF is the inulin, which can be used as a fat substitute mainly in the nonmeat foods types (the cakes, the chocolates, the dairy products types, the spreads) because of its contributions to better mouthfeel, enhanced flavor, and low-caloric value (1.0 kcal/g). The Low-fat, dry-fermented sausages with a fat content close to 50 and 25% of the original amount and supplemented with 7.5 and 12.5% of inulin. The results indicate that inulin impacts a softer texture and a tenderness, springiness, and adhesiveness very similar to that of

conventional sausages. A low-calorie product (30% of the original) can be obtained with approximately 10% inulin (127- 132).

The Epidemiological studies have shown that the consumption of fruits and vegetables imparts health benefits, for example, reduced the risk of coronary heart disease, the stroke, and certain types of the cancer. Apart from the dietary fiber, the fruits and the vegetables contain health benefits that are mainly attributed to the organic micronutrients such as the carotenoids, the polyphenolics, the tocopherols, the vitamin C, and others.

The Inner pea fiber was identified as an ingredient capable of retaining high fat and water in the ground beef. The Inner pea fiber is manufactured from the inner cell walls of the yellow field peas and contains approximately 48% fiber, 44% starch, and 7% protein. This fiber may improve the sensory properties of the lower fat ground beef by retaining substantial amounts of both the moisture and the fat that are normally lost during cooking. This source was added in a dry form to lower-fat beef patties (10% and 14%), in which it improved tenderness and cooking yield without having negative effects on juiciness and flavor (133-138).

Another important source of fiber is fruits, which can be obtained as by-products types of plant food processing. The Citrus byproducts types (the lemon albedo and the orange fiber powder) have been added, at different concentrations, to cooked and dry-cured sausages with excellent results. The Lemon albedo was added at different concentration (2.5% to 10%) to the cooked sausages and the dry-cured sausages. The addition of the lemon albedo to both sausages had healthy effects due to the presence of active biocompounds, which induced a decrease in residual nitrite levels. The Sausages with 2.5% to 7.5% lemon albedo added had sensory properties similar to conventional sausages. The Orange fiber powder was added at different concentrations (0.5% to 2%) to cooked sausages (bolognas). The results showed that the addition improved the nutritional value, decreased the residual nitrite level, and delayed the oxidation process as determined by the TBA values and the red color. Citrus fiber at all concentrations made the products types harder and less springy and chewy. All the samples had a similarly good score in the sensory analysis, except the sample with 2% citrus fiber. The effect of adding cereal and fruit fibers on the sensory properties of reduced-fat, dry-fermented sausages. The cereal (wheat and oat) and fruit (peach, apple, and orange) dietary fibers were added at 1.5% and 3% concentrations (139,140,141,142,143 and 144). The addition of dietary fiber from cereals and fruits at 1.5% resulted in sausages with a final fiber content, after ripening, of about 2%, which represents an improvement in their nutritional properties and provides an acceptable sensory profile. Higher amounts of fiber (3%) increased the hardness, resulting in products types with a lower sensory quality. The best results in this study were obtained with sausages containing 10% pork backfat and 1.5% fruit fiber. The orange fiber provides the best results with sensory properties similar to those of conventional sausage (145-150).

Conclusion

The Meat and the meat products types can be altered by removing or lowering ingredients that are deemed detrimental or by introducing ingredients that are thought to be healthful. By adding these components to the meat products types, processors can enhance the goods' nutritional value and overall wellness. The usage of these compounds leads to goods with inferior sensory and physicochemical quality—particularly when they are added in excessive amounts. The findings indicate that a wide range of compounds may be added to the meat products types to provide them functional qualities, but further investigation is required to comprehend how these chemicals interact with the components of the meat products types and hence enhance their safety for possible industrial uses.

ORCID

https://orcid.org/0000-0002-8969-2677

Conflicts of Interest

The author declare no conflicts of interest

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DOI: 10.31579/2640-1053/217