

CHAPTER 5

MEAT AND MEAT PRODUCTS



Meat and meat products show highly satiating characteristics and in this respect, functional foods 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 industry, the meat and related products industry in particular, could contribute to making lives easier and more active.

Meat and meat products have many disease-preventing, health-promoting benefits, which makes them a viable option to be used as functional foods. The research highlighted that enriching meats with fibre, probiotics and omega-3 fatty acids may help consumers to link meat with a healthy lifestyle. Meat contains many important nutrients, including bioactive compounds such as taurine, L-carnitine, creatine, conjugated linoleic acid (CLA) and endogenous antioxidants. Meat also contains unique endogenous antioxidants including carosine, anserine and others, along with iron and zinc, nutrients often lacking in the average diet. It also contains a significant source of vitamin B-12. Fibre-enriched meat products may also offer health advantages, although they can elicit a grainy texture and have a restrictive digestive tolerance.

Various approaches are being followed for the development of functional meat products including production practices, post harvest techniques and reformulation techniques. Among these this reformulation is most commonly used method to develop functional meat products as it can help to avoid undesirable component and obtain most desirable composition with optimum palatability. It is possible to develop enormous range of functional meat products with the help of functional ingredients through reformulation technique. Such functional meat products may be obtained by following various approaches.

Fat reduction and alteration in meat products

Consumer acceptability of meat products is determined by various factors. These include nutritional value, price of protein and quantity as well as quality of the final product. Now-a-days, health conscious consumer is also concerned about fat content of meat and meat products. The lipid content of lean meat is very less but the percentage of fat content reaches much higher in processed meat products. Saturated fatty acids and monounsaturated fatty acids are dominant in meat fat. Different methods of fat reduction in meat products include trimming of external and intermuscular fat, genetic and dietary modification and fat replacements or substitutes.

Addition of vegetable oils to meat products

Vegetable oils have also been used as partial substitutes of pork backfat in low-fat frankfurters and other types of cooked product giving rise to products with more adequate fatty acid profiles and cholesterol levels than traditional one. Other studies on fermented sausages found that the replacement of 20% pork backfat with olive oil does not affect the weight losses and makes the sausages lighter in 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 hardening. In their studies into “salami” products, found that the partial substitution of pork backfat by extra virgin olive oil did not substantially affect the chemical, physical, and sensory characteristics of the products, with the exception of water activity and firmness. Linseed oil is another source of fat, substitute of pork backfat with linseed oil in the manufacture of dry-fermented sausages decreased the n6:n-3 ratio (from 14.1 to 2.1) as a consequence of the increase in - linolenic acid.

Addition of soy

Soy proteins (flours, concentrates, and isolates) are more commonly used in processed meat products for their functional properties and relatively low cost compared with lean meat. Soy proteins have been incorporated in these products for their water-binding and fat-binding ability, enhancement of emulsion stability, and increased yields.

Substitution of nitrite in meat products

The curing of meat generally involves the use of a mixture of sodium chloride, sugar, nitrate and/or nitrite and often a reductant such as sodium ascorbate or sodium erythorbate. Nitrites play an important role in preservation, flavour development and possibly for texture. The main contribution of nitrite to the preservation of meat products is its ability to inhibit C. It has been found that a reduction in pH drastically lowered residual nitrite.

Other novel ingredients for functional meat products

There are various health promoting ingredients, that when incorporated at appropriate levels can make meat products healthier or functional. Certain bioactive components like, polyunsaturated fatty acids, use of lecithin, various pre and probiotics, isoflavones, saponins, phytosterols, phytates, proteinase inhibitors, oligosaccharides and powdered brewers yeast can be added in the meat products to make them healthier. Whey protein can be used to develop functional food or meat products. Aloe Vera leaf gel can also be added in meat products to make them functional due to its possible health related action. Supplementing meat products with omega-3 fatty acids can have beneficial effects on the health.

Microbial contamination of meat and meat products is unavoidable as microorganisms are present on animals and in their environment. Thus, raw and not fully heated (commercially processed) or otherwise processed/preserved (e.g. frozen, fermented/dried, high hydrostatic pressure processed, irradiated) meat and meat products are prone to spoilage and compromised safety due to microbial presence and growth. Raw meat products (although few consumers eat certain meat products raw or undercooked, intentionally or accidentally; a practice not recommended) need further processing and/or cooking before consumption. This makes them shelf-stable or semi-perishable, and safe for consumption or ready-to-eat. In general, the shelf-life, quality and safety of meat and meat products are extended and improved through adequate processing, appropriate marketing, storage and preparation for consumption, under properly clean, sanitary and hygienic conditions, following an integrated approach throughout all sectors

of the food supply web, including producers, processors, distributors, retailers, as well as consumers.

REFERENCES

1. Sofos, J. N. 2014. Food Safety Management. *A Practical Guide for the Food Industry*. Pp 119-162.
2. Price, James F.; Schweigert, B.S.; American Meat Institute Foundation (USA) [Corporate Author] *The Science of meat and meat products* [1987] Food and Nutrition Press ISBN: 09-176-78214
3. F Jiménez Colmenero Relevant factors in strategies for fat reduction in meat Products February 2000 *Trends in Food Science & Technology* 11(2):56-66 DOI:10.1016/S0924-2244(00)00042-X
4. Yousefi M, Khorshidian N, Hosseini H. Potential Application of Essential Oils for Mitigation of *Listeria monocytogenes* in Meat and Poultry Products. *Front Nutr.* 2020 Nov 24;7:577287. doi: 10.3389/fnut.2020.577287. eCollection 2020.PMID: 33330578
5. Karolina Ferysiuk, Karolina M Wójciak Reduction of Nitrite in Meat Products through the Application of Various Plant-Based Ingredients PMID: 32764511 PMCID: PMC7464959 DOI: 10.3390/antiox9080711
6. IARC. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Red Meat and Processed Meat/IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. International Agency for Research on Cancer; Lyon, France: 2018. pp. 107–422.
7. Daniela Miotto Bernardi, Teresinha Marisa Bertol, Sérgio Bertelli Pflanzler, Valdemiro Carlos Sgarbieri, Marise Aparecida Rodrigues Pollonio ω -3 in meat products: benefits and effects on lipid oxidative stability PMID: 26676414 DOI: 10.1002/jsfa.7559