ClinicSearch

Clinical Research and Clinical Reports

Fahim Aziz Eldin Shaltout *

Open Access

Research Article

How nutritional value of the meat and how we can reduce its microbial hazards

Fahim Aziz Eldin Shaltout

Department of food Hygiene and control, Faculty of Veterinary Medicine, Benha University, Egypt

***Correspondence Author:** Fahim Aziz Eldin Shaltout, Department of food Hygiene and control, Faculty of Veterinary Medicine, Benha University, Egypt

Received Date: 08 November; 2024 **Accepted Date**: 26 November; 2024 **Published Date**: 13 December;2024.

Citation: F. A. Eldin Shaltout, (2024), How nutritional value of the meat and how we can reduce its microbial hazards, *Clinical Research and Clinical Reports,* 5(5); **DOI:**10.31579/2835-8325/126

Abstract

The Meat is a valuable part of the human diet as the meat contains essential elements such as meat protein, meat vitamins, and meat minerals. The meat products types are vulnerable to the microbial meat pathogens and the meat spoilage, posing significant risks to the public health and the social meat quality. The Ionizing radiation method is used in the irradiated meat to maintain the meat safety and meat quality of the consumed meat products types specifically the beef meat.

During recent decades, the irradiation method of the meat products reduces the microbial meat contamination and extends the storage period of the meat. The procedure entails exposing the meat products types to a regulated amount of the ionizing radiation method, mostly accomplished by applying the gamma ray's method, the electron beams method, or the X rays' method. The radiation causes disrupt the DNA and other cellular components of the microbes contaminating the meat, making the microbes unable to reproduce and causing death of the microbial contamination. The procedure causes break down some of the molecules of the meat which can affect the meat nutritional quality and meat sensory properties.

Key words: beef meat; dna, the gamma ray's method; the meat irradiation method; the human health hazard

Introduction

Despite the irradiation potential benefits, the irradiated meat products types remain controversial, with concerns about the irradiation meat safety, efficacy, and irradiation effect on the meat nutritional quality and the meat sensory properties of meat products types. The irradiated meat products types could create the harmful compounds or destroy the essential nutrients. In contrast, others questioned the need for the irradiation method, considering other meat safety measures, such as the good manufacturing practices and the meat testing. The Consumer acceptance of the irradiated meat products types needs to be addressed, with some people expressing concerns about the meat safety and meat acceptability (1,2,3,4,5 and 6). Our review article aims to important evaluate the irradiated meat products types and its repercussions on the meat quality and the meat safety of the beef meat products. To proof the meat irradiation method effectiveness at lowering the microbial meat contamination and prolonging the shelf life of the beef meat is explored along with its potential effect on the physical and the chemical characteristics, the meat nutrient content, and the meat sensory properties. This review article addresses the regulatory framework for the irradiated meat types, including the consumed meat labeling requirements and the consumed meat government oversight, as well as identify the areas for more meat researches and meat policy development (7,8,9,10,11 and 12).

The Sources and Principles of the irradiated meat products types:

The meat Ionizing radiation method such as gamma rays' method, the X rays' method, or the high energy electrons method, is used to irradiate the meat types. The irradiated meat products types are determined by the absorbed dose expressed in Gray (Gy) or kilo Gray (kGy), with one Gray being equal to one J/kg of product. The technique is considered a safe and effective way to decrease or eliminate the hazardous microbes, prolong the shelf life, as well as enhance the meat quality and safety of the meat types (79,80,81,82,83 and 84). The principles of the irradiated meat products types are determined by the ability to disrupt the genetic material of microorganisms, preventing them from reproducing or causing illness. The irradiation method affects the microorganisms' genetic material (the DNA or the RNA) directly and indirectly. The Direct irradiation method can break the bonds between base pairs in the genetic material, killing the cell's reproduction ability. The damage to the water molecules creates free radicals and reactive oxygen, which damage genetic material indirectly. The Irradiation method helps to break down certain enzymes and meat proteins that can contribute to spoilage, thereby increasing the shelf life of the meat (13,14,15,16,17 and 18). The United State, Canada, as well as several European and Asian nations, allow the irradiated meat products types using the Cobalt 60 method, cesium 137 methods and the electron beam accelerators method. The Cobalt 60 method, the most prevalent source of the ionizing radiation method for the irradiated meat products types, is a radioactive isotope that emits the gamma rays capable of penetrating deep into the meat products types to destroy the harmful microorganisms. The Cesium 137 method is another source of the ionizing radiation method; it is less commonly used than cobalt 60. The electron beam accelerators are used

for the irradiated meat products types. The devices generate high energy electrons method that can penetrate the meat products types to eliminate the harmful microorganisms and extend the beef meat shelf life (19,20,21,22,23 and 24). The Irradiating meat products types have several benefits to the meat including multifunctional applications as well as guaranteed meat safety and meat security. The spectrum produced is effective against the bacterial spores across a broad range of concentrations. The processing does not involve heat, it is safe for the meat products types, does not significantly reduce the meat nutrient levels, leaves no chemical residues, and is simple to control during use to effectively lengthen the lifespan of the irradiated meat products types. The Radurization method uses low doses of 0.1–1 kGy (85,86,87,88,89 and 90). This dose inhibits respiration, delays the ripening, disinfects the meat pests, and inactivates the Trichinella parasite. The Radicidation method is referred to as a moderate dose. The meat radiation uses a quantity of approximately 1–10 kGy, which has the effect of reducing the microbial meat spoilage and the microbial meat pathogens including the Salmonella species and the Listeria monocytogenes which contaminate the meat. In regarding to this dosage is typically found in the frozen meat products types and its application is identical to that of the pasteurization method, except irradiation method does not rely on the thermal energy method (91,92,93,94,95 and 96). The Radapertization method uses extremely high doses which are above or equal to 10 kGy, ranging between 30 and 50 kGy. The irradiation dose is typically used in the sterilization process because its effect can kill all the contaminating microorganisms in the meat products types up to the level of the spores of the microorganisms. The irradiated meat products type's origin and the principles are based on the ability of the ionizing radiation method to disrupt the genetic material of the microorganisms, the enzymes, and the proteins in the meat products types, culminating in improved meat safety and meat quality. The use of irradiation method is regulated by the national and the international authorities to ensure its safety and effectiveness in the meat preservation (25,26,27,28,29 and 30).

The action of Irradiation method on the irradiated beef meat products:

The Microbial Safety of the irradiated beef meat products:

The Microbial meat safety is important aspect of the beef meat production and consumption, as these meat products can be a source of the various harmful microorganisms that can cause the meat borne illness. The beef meat products are potentially contaminated with microbial pathogens, such as Salmonella, Escherichia coli, Campylobacter, and Listeria monocytogenes, leading to severe illness or death in vulnerable populations (31,32,33,34,35 and 36). Meat Contamination might occur at the production, processing, or distribution stage, including on the farm, during transport, in slaughterhouses or processing facilities, and in meat retail outlets or at home. The Improper beef meat handling and the storage of the beef meat products can increase the risk of beef meat contamination (97,98,99,100,101 and 102). The meat borne illness outbreaks related to the beef meat have been reported in the world with various types of the meat products being implicated, including the ground beef meat products, the chicken meat products, the pork meat products, and the processed beef meat products. The outbreaks have led to the significant public health hazards, the social meat quality and the economic consequences, the highlighting the importance of the effective interventions to reduce the risk of the meat contamination (37,38,39,40,41 and 42). The Irradiation method has been studied extensively for its efficacy in reducing the microbial contamination of the beef meat. The exposing of the meat products types to the ionizing radiation method, the latter reduces or eliminates the harmful meat microorganisms that can cause meat borne illness and affect the social meat quality. The irradiation method could effectively reduce the levels of the meat microbial pathogens such as Salmonella species and Escherichia coli as well as levels of the meat spoilage organisms leading to improved microbial meat safety and a reduced the risk of the meat borne illness and improve the social meat quality (103,104,105,106,107 and 108). The effectiveness of the different types of the ionizing radiation method on the beef meat including the gamma ray's method and the e beams method, has been used; the gamma ray irradiation method is more effective than the e beam meat irradiation method is at inhibiting the microbial growth in the beef meat. The UV light method effectively eliminates the Salmonella species, the Pseudomonas species, the Micrococcus species, and the Staphylococcus species on the beef meat. The shelf life of the beef meat products types is extended by eliminating the microbial meat contaminant (109,110,111, 112, 113 and 114). The Gamma irradiation method at low doses can improve the microbiological meat safety, ensure meat safety, and extend the chicken meat's products shelf life without affecting the meat quality. The 3 kGy gamma irradiated beef meat reduced the growth of the mesophilic bacteria, coliforms bacteria, and the Staphylococcus aureus bacteria (115,116,117,118,119 and 120). The Food and Drug Administration (FDA) determined that a 3.5 kGy gamma ray irradiation method dose effectively eliminates the pathogenic microbes from the fresh beef meat and improve the social meat quality. The meat Irradiation method slows the growth of the bacterial cells and deactivating the bacterial metabolism (157,158,159,160,161 and 162). The Bacteria are inherently resistant to the action of the irradiation method and, in the lag phase or inactive state, will be more resistant. In contrast, the bacteria in the growth phase will be more effective (43,44,45,46,47 and 48).

The Chemical Properties of the irradiated beef meat products types:

The chemical properties of the irradiated beef meat refer to the changes that occur to the chemical constituents and the compositions of the meat products types due to exposure to the ionizing radiation method and affect the social meat quality. The Irradiation method can cause both the desirable and the undesirable action on the chemical characteristics of the beef meat, depending on the dose and the specific compounds in the meat products types (49,50,51,52,53 and 54). The most significant changes often observed in the irradiated beef meat products is the formation of the free radicals. They become reactive molecules that damage cellular components and cause oxidative stress. Thus, lipid oxidation, which causes off flavors and odors, as well as a decline in the nutritional meat quality due to the loss of essential fatty acids and other nutrients (121,122,123,124,125 and 126). The irradiation method at lower doses aids lipid oxidation by reducing the levels of peroxides and other reactive species. This procedure affects the meat protein content of the beef meat, leading to alterations in the composition of the amino acids, meat protein structure, and meat digestibility. The changes have potentially positive and negative action, mostly on the meat nutritional value and affect the social meat quality, that are contingent upon the particular meat proteins involved and the dose of radiation used (127,128,129,130,131 and 132). The positive action of the irradiation method includes the fact that the irradiation method can cause the formation of reactive species, such as the free radicals, which can cause the formation of the covalent bonds between the amino acids in the meat protein molecules (163,164,165,166,167,168,169 and 170). The cross linking can change the structure of a meat protein molecule and make it resistant to enzymatic meat digestion, which causes a decrease in the meat protein digestibility (55,56,57,58,59 and 60). The Irradiation method can cause the denaturation of the meat protein molecules. The Denaturation involves opening the meat protein structure, which can facilitate the interactions between the amino acids and increase the accessibility of the digestive enzymes to meat protein molecules, and it can improve the meat protein digestibility (133,134,135,136,137 and 138). The irradiation method can cause adverse action; namely, the excessive irradiation method can cause a breakdown of or changes in the amino acid compounds in the meat protein molecules which cause a decrease in the overall amino acid content and consequently decrease the meat protein digestibility. The electron beam irradiation method at less than 3 kGy did not affect changes in the meat quality of the smoked duck flesh (the amino acids, the fatty acids, and the volatiles) during the storage (61,62,63,64,65 and 66). The chemical changes, the irradiation method affects the vitamin content of the beef meat products, with some vitamins being more sensitive than others. For example, the irradiation method leads to a loss of the vitamin C, while other vitamins, such as the vitamin A and E, are relatively stable. The Irradiation method alter the beef meat oxidation–reduction ability, accelerating the lipid oxidation, the meat protein breakdown, and the flavor and the odor changes (67,68,69,70,71 and 72). When combined with certain antioxidants, such as the flavonoids, the irradiation method can help prolong the induction period of the lipid oxidation., storing the irradiated beef meat at 5–10 C for one week almost did not change the pH, the texture, the total volatile base nitrogen (TVBN), or the microbe number (145,146,147,148,149 and 150). A higher dose of the UV irradiation method increased two thiobarbituric acid (TBA) content,

decreased the water holding capacity (WHC), and the decreased the beef meat color intensity and the tenderness (139,140,141,142,143 and 144). The 2.5 and 5 kGy gamma irradiation method reduced the nitrite content in the chicken sausages and prevented the oxidation when combined with the antioxidants. The titratable acidity and the acid value in the beef meat can be reduced by the irradiation method (73,74,75,76,77 and 78). The beef meat contamination may occur at the production, the processing, or the distribution stage, including on the farm, during the transport, in the slaughterhouses or the processing facilities, and in the retail outlets or at the home (151,152,153,154,155 and 156).

Conclusion:

The Improper handling and the storage of the beef meat products can increase the risk of the beef meat contamination. The meat borne diseases outbreaks related to the beef have been reported globally and its effect on the social meat quality, with the various types of the meat products types being implicated, including the ground beef meat products types, the chicken meat products types, the pork meat products types, and the processed beef meat products types.

Conflicts of Interest

The authors declare no conflicts of interest.

References:

1. Shaltout, F.A., Riad,E.M ., and AbouElhassan, Asmaa , A(2017): prevalence Of Mycobacterium Tuberculosis In Imported cattle Offals And Its lymph Nodes. Veterinary Medical Journal -Giza (VMJG), 63(2): 115 – 122.
2. Saucier, L. Microbial Spoilage, Quality and Safety within the Context of Meat Sustainability. Meat Sci. 2016, 120, 78–84.
3. Shaltout, F.A., Riad,E.M ., and Asmaa Abou-Elhassan (2017): Prevalence Of Mycobacterium Spp . In Cattle Meat and Offal's Slaughtered in And Out Abattoir. Egyptian Veterinary medical Association, 77(2): 407 – 420.
4. Abd Elaziz, O., Fatin S. Hassanin, Fahim A. Shaltout and Othman A. Mohamed (2021): Prevalence of Some Foodborne Parasitic Affection in Slaughtered Animals in Loacal Egyptian Abottoir. Journal of Nutrition Food Science and Technology 2(3): 1-5.
5. Pereira, P.M.d.C.C.; Vicente, A.F.d.R.B. Meat Nutritional Composition and Nutritive Role in the Human Diet. Meat Sci. 2013, 93, 586–592.
6. Abd Elaziz, O., Fatin, S Hassanin, Fahim, A Shaltout, Othman, A Mohamed (2021): Prevalence of some zoonotic parasitic affections in sheep carcasses in a local abattoir in Cairo, Egypt. Advances in Nutrition & Food Science 6(2): 6(2): 25-31.
7. Al Shorman,A.A.M. ;Shaltout,F.A. and hilat,N (1999):Detection of certain hormone residues in meat marketed in Jordan.Jordan University of Science and Technology, 1st International Conference on Sheep and goat Diseases and Productivity, 23-25 October, 1999.
8. Ebeed Saleh, Fahim Shaltout, Essam Abd Elaal (2021); Effect of some organic acids on microbial quality of dressed cattle carcasses in Damietta abattoirs, Egypt. Damanhour Journal of Veterinary Sciences 5(2): 17-20.
9. Edris A, Hassanin, F. S; Shaltout, F.A., Azza H Elbaba and Nairoz M Adel (2017): Microbiological Evaluation of Some Heat-Treated Fish Products in Egyptian Markets.EC Nutrition 12.3 (2017): 124-132.
10. Edris, A., Hassan,M.A., Shaltout,F.A. and Elhosseiny , S(2013): Chemical evaluation of cattle and camel meat.BENHA VETERINARY MEDICAL JOURNAL, 24(2): 191-197 .
11. Edris, A.M., Hassan,M.A., Shaltout,F.A. and Elhosseiny , S(2012): Detection of E.coli and Salmonella organisms in cattle and camel meat. BENHA VETERINARY MEDICAL JOURNAL, 24(2): 198-204.
12. Edris A.M.; Hemmat M. I., Shaltout F.A.; Elshater M.A., Eman F.M.I. (2012): STUDY ON INCIPIENT SPOILAGE OF CHILLED CHICKEN CUTS-UP. BENHA VETERINARY MEDICAL JOURNAL, VOL. 23, NO. 1, JUNE 2012: 81-86 .
13. Edris A.M.; Hemmat M.I.; Shaltout F.A.; Elshater M.A., Eman, F.M.I. (2012): CHEMICAL ANALYSIS OF CHICKEN MEAT WITH RELATION TO ITS QUALITY. BENHA VETERINARY MEDICAL JOURNAL, 23(1): 87-92 .
14. Borrego-Soto, G.; Ortiz-López, R.; Rojas-Martínez, A. Ionizing Radiation-Induced DNA Injury and Damage Detection in Patients with Breast Cancer. Genet. Mol. Biol. 2015, 38, 420–432.
15. Edris, A.M.; Shaltout, F.A. and Abd Allah, A.M. (2005): Incidence of Bacillus cereus in some meat products and the effect of cooking on its survival. Zag. Vet. J.33 (2):118-124.
16. Edris, A.M.; Shaltout, F.A. and Arab, W.S. (2005): Bacterial Evaluation of Quail Meat. Benha Vet. Med.J.16 (1):1-14.
17. Edris, A.M.; Shaltout, F.A.; Salem, G.H. and El-Toukhy,E.I. (2011): Incidence and isolation of Salmonellae from some meat products.Benha University ,Faculty of Veterinary Medicine , Fourth Scientific Conference 25-27th May 2011Veterinary Medicine and Food Safety) 172-179 benha , Egypt.
18. Edris AA, Hassanin, F. S; Shaltout, F.A., Azza H Elbaba and Nairoz M Adel. (2017): Microbiological Evaluation of Some Heat-Treated Fish Products in Egyptian Markets. EC Nutrition 12.3 (2017): 134-142.
19. Edris, A.M.; Shaltout, F.A.; Salem, G.H. and El-Toukhy,E.I. (2011): Plasmid profile analysis of Salmonellae isolated from some meat products. Benha University, Faculty of Veterinary Medicine, Fourth Scientific Conference 25-27th May 2011Veterinary Medicine and Food Safety)194-201 bennah, Egypt.
20. Ragab A, Abobakr M. Edris, Fahim A.E. Shaltout, Amani M. Salem (2022): Effect of titanium dioxide nanoparticles and thyme essential oil on the quality of the chicken fillet. BENHA VETERINARY MEDICAL JOURNAL41(2): 38-40.
21. Hassan, M.A, Shaltout, F. A, Arfa M.M, Mansour A.H and Saudi, K. R(2013): BIOCHEMICAL STUDIES ON RABBIT MEAT RELATED TO SOME DISEASES. BENHA VETERINARY MEDICAL JOURNAL 25(1):88-93.
22. Hassan, M. A and Shaltout, F.A. (1997): Occurrence of Some Food Poisoning Microorganisms In Rabbit Carcasses Alex.J.Vet.Science, 13(1):55-61.
23. Hassan M, Shaltout FA* and Saqur N (2020): Histamine in Some Fish Products. Archives of Animal Husbandry & Dairy Science 2(1): 1-3.
24. Alex.J.Vet.Science, 20(21):21-30.
25. Erkmen, O.; Bozoglu, T.F. Food Preservation by Irradiation. In Food Microbiology: Principles into Practice; John Wiley & Sons, Ltd.: Hoboken, NJ, USA, 2016; pp. 106–126, ISBN 9781119237860.
26. Hassan, M.A; Shaltout, F.A.; Arafa, M.M.; Mansour, A.H. and Saudi, K.R.(2013): Biochemical studies on rabbit meat related to some diseases . Benha Vet. Med.J.25 (1):88-93.
27. Klurfeld, D.M. What Is the Role of Meat in a Healthy Diet? Anim. Front. 2018, 8, 5–10.
28. Hassan, M. A; Shaltout, F.A.; Maarouf, A.A. and El-Shafey, W.S. (2014): Psychrotrophic bacteria in frozen fish with special reference to pseudomonas species. Benha Vet. Med.J.27 (1):78-83.

29. Hassan, M.A; Shaltout, F.A.; Arafa, M.M.; Mansour, A.H. and Saudi, K.R. (2013): Bacteriological studies on rabbit meat related to some diseases Benha Vet. Med.J.25 (1):94-99.
30. Hassanin, F. S; Hassan,M.A., Shaltout, F.A., Nahla A. Shawqy and 2Ghada A. Abd-Elhameed (2017): Chemical criteria of chicken meat.BENHA VETERINARY MEDICAL JOURNAL, 33(2):457-464.
31. Hassanin, F. S; Hassan,M.A.; Shaltout, F.A. and Elrais-Amina, M(2014): CLOSTRIDIUM PERFRINGENS IN VACUUM PACKAGED MEAT PRODUCTS. BENHA VETERINARY MEDICAL JOURNAL, 26(1):49-53.
32. Hassanien, F.S.; Shaltout, F.A.; Fahmey, M.Z. and Elsukkary, H.F. (2020): Bacteriological quality guides in local and imported beef and their relation to public health. Benha Veterinary Medical Journal 39: 125-129.
33. Bantawa, K.; Rai, K.; Subba Limbu, D.; Khanal, H. Food-Borne Bacterial Pathogens in Marketed Raw Meat of Dharan, Eastern Nepal. BMC Res. Notes 2018, 11, 618.
34. Hassanin, F. S; Shaltout,F.A. and , Mostafa E.M(2013): Parasitic affections in edible offal. Benha Vet. Med.J.25 (2):34-39.
35. Hassanin, F. S; Shaltout, F.A., Lamada, H.M., Abd Allah, E.M. (2011): THE EFFECT OF PRESERVATIVE (NISIN) ON THE SURVIVAL OF LISTERIA MONOCYTOGENES. BENHA VETERINARY MEDICAL JOURNAL (2011)-SPECIAL ISSUE [I]: 141-145.
36. Khattab, E.,Fahim Shaltout and Islam Sabik (2021): Hepatitis A virus related to foods. BENHA VETERINARY MEDICAL JOURNAL 40(1): 174-179.
37. Saad M. Saad, Fahim A. Shaltout, Amal A. A. Farag & Hashim F. Mohammed (2022): Organophosphorus Residues in Fish in Rural Areas. Journal of Progress in Engineering and Physical Science 1(1): 27-31.
38. Saif,M. , Saad S.M. , Hassanin, F. S; Shaltout FA, Marionette Zaghloul (2019): Molecular detection of enterotoxigenic Staphylococcus aureus in ready-to-eat beef products. Benha Veterinary Medical Journal 37 (2019) 7-11.
39. Saif,M. , Saad S.M. , Hassanin, F. S; Shaltout, F.A., Marionette Zaghlou (2019); Prevalence of methicillin-resistant Staphylococcus aureus in some ready-to-eat meat products. Benha Veterinary Medical Journal 37 (2019) 12-15.
40. Farag, A. A., Saad M. Saad[1], Fahim A. Shaltout1, Hashim F. Mohammed (2023 a): Studies on Pesticides Residues in Fish in Menofia Governorate. Benha Journal of Applied Sciences. 8(5): 323-330.
41. Farag, A. A., Saad M. Saad[1], Fahim A. Shaltout1, Hashim F. Mohammed (2023 b): Organochlorine Residues in Fish in Rural Areas. Benha Journal of Applied Sciences, 8 (5): 331-336.
42. Shaltout, F.A., Mona N. Hussein, Nada Kh. Elsayed (2023): Histological Detection of Unauthorized Herbal and Animal Contents in Some Meat Products. Journal of Advanced Veterinary Research 13(2): 157-160.
43. Shaltout, F. A, Heikal, G. I., Ghanem, A. M. (2022): Mycological quality of some chicken meat cuts in Gharbiya governorate with special reference to Aspergillus flavus virulent factors. benha veteriv medical journal veterinary 42(1): 12-16.
44. Shaltout, F.A., Ramadan M. Salem, Eman M. Eldiasty, Fatma A. Diab (2022): Seasonal Impact on the Prevalence of Yeast Contamination of Chicken Meat Products and Edible Giblets. Journal of Advanced Veterinary Research 12(5): 641-644.
45. Shaltout, F.A., Abdelazez Ahmed Helmy Barr and Mohamed Elsayed Abdelaziz (2022): Pathogenic Microorganisms in Meat Products. Biomedical Journal of Scientific & Technical Research 41(4): 32836-32843.
46. Farkas, J. Irradiation for Better Foods. Trends Food Sci. Technol. 2006, 17, 148–152.
47. Shaltout, F.A., Thabet, M.G. and Koura, H.A. (2017). Impact
48. of Some Essential Oils on the Quality Aspect and Shelf Life of
49. Meat. J Nutr Food Sci., 7: 647.
50. Shaltout, F. A, Islam Z. Mohammed[2], El -Sayed A. Afify(2020): Bacteriological profile of some raw chicken meat cuts in Ismailia city, Egypt.Benha Veterinary Medical Journal 39 (2020) 11-15.
51. Schevey, C.T.; Toshkov, S.; Brewer, M.S. Effect of Natural Antioxidants, Irradiation, and Cooking on Lipid Oxidation in Refrigerated, Salted Ground Beef Patties. J. Food Sci. 2013, 78, S1793–S1799.
52. Shaltout, F.A.,Islam, Z. Mohammed[2]., El -Sayed A. Afify(2020): Detection of E. coli O157 and Salmonella species in some raw chicken meat cuts in Ismailia province, Egypt. Benha Veterinary Medical Journal 39 (2020) 101-104.
53. Shaltout, F.A., E.M. El-diasty and M. A. Asmaa- Hassan (2020): HYGIENIC QUALITY OF READY TO EAT COOKED MEAT IN RESTAURANTS AT Cairo. Journal of Global Biosciences 8(12): 6627-6641.
54. Shaltout, F.A., Marrionet Z. Nasief, L. M. Lotfy, Bossi T. Gamil (2019): Microbiological status of chicken cuts and its products. Benha Veterinary Medical Journal 37 (2019) 57-63.
55. Shaltout, F.A. (2019): Poultry Meat. Scholarly Journal of Food and Nutrition 22 1-2.
56. Munir, M.T.; Federighi, M. Control of Foodborne Biological Hazards by Ionizing Radiations. Foods 2020, 9, 878.
57. Shaltout, F.A. (2019): Food Hygiene and Control. Food Science and Nutrition Technology 4(5): 1-2.
58. Hassanin, F. S; Shaltout, F.A., Seham N. Homouda and Safaa M. Arakeeb(2019): Natural preservatives in raw chicken meat. Benha Veterinary Medical Journal 37 (2019) 41-45.
59. Hazaa,W. , Shaltout, F.A., Mohamed El-Shate(2019): Prevalence of some chemical hazards in some meat products. Benha Veterinary Medical Journal 37 (2) 32-36.
60. Ahn, D.U.; Kim, I.S.; Lee, E.J. Irradiation and Additive Combinations on the Pathogen Reduction and Quality of Poultry Meat. Poult. Sci. 2013, 92, 534–545.
61. Hazaa,W, Shaltout, F.A., Mohamed El-Shater(2019): Identification of Some Biological Hazards in Some Meat Products. Benha Veterinary Medical Journal 37 (2) 27-31.
62. Gaafar,R. , Hassanin, F. S; Shaltout, F.A., Marionette Zaghloul (2019): Molecular detection of enterotoxigenic Staphylococcus aureus in some ready to eat meat-based sandwiches. Benha Veterinary Medical Journal 37 (2) 22-26.
63. Gaafar,R. , Hassanin, F. S; Shaltout, F.A., Marionette Zaghloul(2019): Hygienic profile of some ready to eat meat product sandwiches sold in Benha city, Qalubiya Governorate, Egypt. Benha Veterinary Medical Journal 37 (2) 16-21.
64. Ehlermann, D.A.E. Safety of Food and Beverages: Safety of Irradiated Foods. In Encyclopedia of Food Safety; Motarjemi, Y.B.T., Ed.; Academic Press: Waltham, MA, USA, 2014; Volume 3, pp. 447–452, ISBN 9780123786128.
65. Saad S.M., Shaltout, F.A., Nahla A Abou Elroos, Saber B El-nahas (2019): Antimicrobial Effect of Some Essential Oils on Some Pathogenic Bacteria in Minced Meat. J Food Sci Nutr Res. 2019; 2 (1): 012-020.
66. Saad S.M, Shaltout, F.A., Nahla A Abou Elroos2 and Saber B El-nahas(2019): Incidence of Staphylococci and E. coli in Meat and Some Meat Products. EC Nutrition 14.6 (2019).
67. Nam, K.C.; Jo, C.; Ahn, D.U. Irradiation of Meat and Meat Products. In Emerging Technologies in Meat Processing: Production, Processing and Technology; JohnWiley & Sons,

Ltd.: Hoboken, NJ, USA, 2016; pp. 7–36, ISBN 9781118350676.

68. Saad S.M., Hassanin, F. S; Shaltout, F.A., Marionette Z Nassif, Marwa Z Seif. (2019: Prevalence of Methicillin-Resistant Staphylococcus Aureus in Some Ready-to-Eat Meat Products. American Journal of Biomedical Science & Research 4(6):460-464.
69. Shaltout, Fahim (2019): Pollution of Chicken Meat and Its Products by Heavy Metals. Research and Reviews on Healthcare: Open Access Journal, 4, 3(381-3382).
70. Oh, H.; Yoon, Y.; Yoon, J.W.; Oh, S.W.; Lee, S.; Lee, H. Salmonella Risk Assessment in Poultry Meat from Farm to Consumer in Korea. Foods 2023, 12, 649.
71. Shaltout, F. A.; E.M EL-diasty; M. S. M Mohamed (2018): Effects of chitosan on quality attributes fresh meat slices stored at 4 C. BENHA VETERINARY MEDICAL JOURNAL, VOL. 35, NO. 2: 157-168.
72. Shaltout and Abdel-Aziz, 2004: Salmonella enterica serovar Enteritidis in poultry meat and their epidemiology. Vet. Med. J. Giza, 52 (2004), pp. 429-436.
73. Ham, Y.K.; Kim, H.W.; Hwang, K.E.; Song, D.H.; Kim, Y.J.; Choi, Y.S.; Song, B.S.; Park, J.H.; Kim, C.J. Effects of Irradiation Source and Dose Level on Quality Characteristics of Processed Meat Products. Radiat. Phys. Chem. 2017, 130, 259–264.
74. Hassanzadeh, P.; Tajik, H.; Rohani, S.M.R.; Moradi, M.; Hashemi, M.; Aliakbarlu, J. Effect of Functional Chitosan Coating and Gamma Irradiation on the Shelf-Life of Chicken Meat during Refrigerated Storage. Radiat. Phys. Chem. 2017, 141, 103–109.
75. Shaltout, F.A., Hala F El-Shorah, Dina I El Zahaby, Lamiaa M Lotfy (2018): Bacteriological Profile of Chicken Meat Products. SciFed Food & Dairy Technology Journal, 2:3.
76. Shaltout, F.A., Mohamed, A.H. El-Shater, Wafaa Mohamed Abd El-Aziz (2015): Bacteriological assessment of Street Vended Meat Products sandwiches in kalyobia Governorate. BENHA VETERINARY MEDICAL JOURNAL, 28(2:)58-66,
77. Indiarto, R.; Pratama, A.W.; Sari, T.I.; Theodora, H.C. Food Irradiation Technology: A Review of the Uses and Their Capabilities. SSRG Int. J. Eng. Trends Technol. 2020, 68, 91–98.
78. Shaltout, F.A., Mohamed A El shatter and Heba M Fahim (2019): Studies on Antibiotic Residues in Beef and Effect of Cooking and Freezing on Antibiotic Residues Beef Samples. Scholarly Journal of Food and Nutritionm 2(1) 1-4
79. Indiarto, R.; Qonit, M.A.H. A Review of Irradiation Technologies on Food and Agricultural Products. Int. J. Sci. Technol. Res. 2020, 9, 4411–4414.
80. Shaltout FA, Zakaria IM and Nabil ME. (2018): Incidence of Some Anaerobic Bacteria Isolated from Chicken Meat Products with Special Reference to Clostridium perfringens. Nutrition and Food Toxicology 2.5 (2018): 429-438.
81. Arvanitoyannis, I.S. Consumer Behavior toward Irradiated Food. In Irradiation of Food Commodities: Techniques, Applications, Detection, Legislation, Safety and Consumer Opinion; Arvanitoyannis, I.S.B.T.-I., Ed.; Academic Press: Boston, MA, USA, 2010; pp. 673–698, ISBN 9780123747181.
82. Shaltout FA, Ahmed A A Maarouf and Mahmoud ES Elkhouly. (2017): Bacteriological Evaluation of Frozen Sausage. Nutrition and Food Toxicology 1.5; 174-185.
83. Fajardo-Guerrero, M.; Rojas-Quintero, C.; Chamorro-Tobar, I.; Zambrano, C.; Sampedro, F.; Carrascal-Camacho, A.K. Exposure Assessment of Salmonella Spp. in Fresh Pork Meat from Two Abattoirs in Colombia. Food Sci. Technol. Int. 2020, 26, 21–27.
84. Shaltout FA, El-Toukhy EI and Abd El-Hai MM. (2019): Molecular Diagnosis of Salmonellae in Frozen Meat and Some Meat Products. Nutrition and Food Technology Open Access 5(1): 1-6.
85. Shaltout, F.A., A.M.Ali and S.M.Rashad (2016): Bacterial Contamination of Fast Foods. Benha Journal of Applied Sciences (BJAS) 1 (2)45-51.
86. Singh, R.; Singh, A. Food Irradiation: An Established Food Processing Technology for Food Safety and Security. Def. Life Sci. J. 2019, 4, 206–213.
87. Shaltout, F.A., Zakaria. I. M., Jehan Eltanani, Asmaa. Elmelegy(2015): Microbiological status of meat and chicken received to University student hostel. BENHA VETERINARY MEDICAL JOURNAL, 29(2):187-192, DECEMBER, 2015.
88. Yeh, Y.; de Moura, F.H.; Van Den Broek, K.; de Mello, A.S. Effect of Ultraviolet Light, Organic Acids, and Bacteriophage on Salmonella Populations in Ground Beef. Meat Sci. 2018, 139, 44–48.
89. Saad,S.M.;Edris, A.M.; Shaltout,F.A. and Edris, Shimaa(2012): Isolation and identification of salmonellae and E.coli from meat and poultry cuts by using A.multiplex PCR. Benha Vet. Med.J.special issue 16-26.
90. Saad, S.M. and Shaltout, F.A. (1998): Mycological Evaluation of camel carcasses at Kalyobia Abattoirs. Vet.Med.J. Giza,46(3):223-229.
91. Rastogi, R.P.; Richa; Kumar, A.; Tyagi, M.B.; Sinha, R.P. Molecular Mechanisms of Ultraviolet Radiation-Induced DNA Damage and Repair. J. Nucleic Acids 2010, 2010, 592980.
92. Saad S.M., Shaltout, F.A., Nahla A Abou Elroos, Saber B El-nahas. 2019: Antimicrobial Effect of Some Essential Oils on Some Pathogenic Bacteria in Minced Meat. J Food Sci Nutr Res. 2019; 2 (1): 012-020.
93. Saad S.M., Hassanin, F. S; Shaltout, F.A., Marionette Z Nassif, Marwa Z Seif. (2019): Prevalence of Methicillin-Resistant Staphylococcus Aureus in Some Ready-to-Eat Meat Products. American Journal of Biomedical Science & Research 4(6):460-464.
94. Gómez, I.; Janardhanan, R.; Ibañez, F.C.; Beriain, M.J. The Effects of Processing and Preservation Technologies on Meat Quality: Sensory and Nutritional Aspects. Foods 2020, 9, 1416.
95. Saad S.M., Shaltout, F.A., Nahla A Abou Elroos and Saber B El-nahas. (2019): Incidence of Staphylococci and E. coli in Meat and Some Meat Products. EC Nutrition 14.6 (2019).
96. haltout FA, Riad EM, TES Ahmed and AbouElhassan A. (2017): Studying the Effect of Gamma Irradiation on Bovine Offal's Infected with Mycobacterium tuberculosis Bovine Type. Journal of Food Biotechnology Research 1 (6): 1-5.
97. Shahi, S.; Khorvash, R.; Goli, M.; Ranjbaran, S.M.; Najarian, A.; Mohammadi Nafchi, A. Review of Proposed Different Irradiation Methods to Inactivate Food-Processing Viruses and Microorganisms. Food Sci. Nutr. 2021, 9, 5883–5896.
98. Shaltout FA, Zakaria IM and Nabil ME. (2018): Incidence of Some Anaerobic Bacteria Isolated from Chicken Meat Products with Special Reference to Clostridium perfringens. Nutrition and Food Toxicology 2.5 (2018): 429-438.
99. Shaltout FA, Mohamed, A.Hassan and Hassanin, F. S(2004): THERMAL INACTIVATION OF ENTEROHAEMORRHAGIC ESCHERICHIA COLI O157:H7 AND ITS SENSTIVITY TO NISIN AND LACTIC ACID CULTURES. 1rst Ann. Confr., FVM., Moshtohor, Sept, 2004.

100. Food and Drug Administration; HHS. Irradiation in the Production, Processing and Handling of Food. Final Rule. Fed. Regist. 2012, 77, 71316–71320.
101. 1Shaltout FA, El-diasty, E, M.; Elmesalamy, M. and Elshaer, M. (2014): Study on fungal contamination of some chicken meat products with special reference to 2 the use of PCR for its identification. Conference,Veterinary Medical Journal – Giza vol. December 2014/12/17 vol.60: 1-10.
102. Bintsis, T. Foodborne Pathogens. AIMS Microbiol. 2017, 3, 529–563.
103. shaltout, F.A. (2002): Microbiological Aspects of Semi-cooked chicken Meat Products. Benha Veterinary Medical Journal13, 2, 15-26.
104. 104.Shaltout FA, Thabet, M.G2 and Hanan, A. Koura3. (2017): Impact of some essential oils on the quality aspect and shelf life of meat.BENHA VETERINARY MEDICAL JOURNAL, 33, (2): 351-364.
105. 105.Park, J.G.; Yoon, Y.; Park, J.N.; Han, I.J.; Song, B.S.; Kim, J.H.; Kim, W.G.; Hwang, H.J.; Han, S.B.; Lee, J.W. Effects of Gamma Irradiation and Electron Beam Irradiation on Quality, Sensory, and Bacterial Populations in Beef Sausage Patties. Meat Sci. 2010, 85, 368–372.
106. 106.Shaltout FA, Mohammed Farouk; Hosam A.A. Ibrahim and Mostafa E.M. Afifi4.2017: Incidence of Coliform and Staphylococcus aureus in ready to eat fast foods. BENHA VETERINARY MEDICAL JOURNAL, 32(1): 13 - 17, MARCH, 2017.
107. 107.Shaltout, F.A., Zakaria, I.M., Nabil, M.E. (2017): Detection and typing of Clostridium perfringens in some retail chicken meat products.BENHA VETERINARY MEDICAL JOURNAL,. 33(2):283-291.
108. 108.Maherani, B.; Hossain, F.; Criado, P.; Ben-Fadhel, Y.; Salmieri, S.; Lacroix, M. World Market Development and Consumer Acceptance of Irradiation Technology. Foods 2016, 5, 79.
109. 109.Shaltout, F.A. (1992): Studies on Mycotoxins in Meat and Meat by Products. M.V.Sc Thesis Faculty of Veterinary Medicine,Moshtohor,Zagazig University Benha branch.
110. 110.Shaltout, F.A. (1996): Mycological and Mycotoxicological profile Of Some Meat products. Ph.D.Thesis, Faculty of Veterinary Medicine, Moshtohor, Zagazig University Benha branch.
111. 111.miri, A.; Zandi, H.; Khosravi, H.M. Effect of Electron Beam Irradiation on Survival of Escherichia Coli O157:H7 and Salmonella Enterica Serovar Thyphimurium in Minced Camel Meat during Refrigerated Storage. J. Food Qual. Hazards Control 2019, 6, 174–178.
112. 112.Shaltout, F.A. (1998): Proteolytic Psychrotrophes in Some Meat products. Alex. Vet. Med. J.14 (2):97-107.
113. 113.Da Vinha, A.C.M.F.; Sousa e Silva, C.A.d.A. Overview of Irradiation: Advantages to Foods of Plant Origin. South Florida J. Health 2022, 3, 248–262.
114. 114.Shaltout, F.A. (1999): Anaerobic Bacteria in Vacuum Packed Meat Products. Benha Vet. Med.J.10 (1):1-10.
115. 115.Song, B.S.; Lee, Y.; Park, J.H.; Kim, J.K.; Park, H.Y.; Kim, D.H.; Kim, C.J.; Kang, I.J. Toxicological and Radiological Safety of Chicken Meat Irradiated with 7.5 MeV X-rays. Radiat. Phys. Chem. 2018, 144, 211–217.
116. 116.Shaltout,F.A.(2000):Protozoal Foodborne Pathogens in some Meat Products. Assiut Vet. Med. J. 42 (84):54-59.
117. 117.Shaltout,F.A.(2001): Quality evaluation of sheep carcasses slaughtered at Kalyobia abattoirs. Assiut Veterinary Medical Journal, 46(91):150-159.
118. 118.D'Souza, C.; Apaolaza, V.; Hartmann, P.; Brouwer, A.R.; Nguyen, N. Consumer Acceptance of Irradiated Food and Information Disclosure—A Retail Imperative. J. Retail. Consum. Serv. 2021, 63, 102699.
119. 119.Shaltout, F.A. (2002): Microbiological Aspects of Semi-cooked Chicken Meat Products. Benha Vet.Med.J. 13(2):15-26.
120. 120.Lianou, A.; Panagou, E.Z.; Nychas, G.J.E. Meat Safety-I Foodborne Pathogens and Other Biological Issues. In Lawrie's Meat Science: Eighth Edition; Toldra´, F., Ed.;Woodhead Publishing: Cambridge, UK, 2017; pp. 521–552, ISBN 9780081006979.
121. Shaltout, F.A. (2003): Yersinia Enterocolitica in some meat products and fish marketed at Benha city.The Third international conference Mansoura 29-30 April.
122. Shaltout, F.A. (2009): Microbiological quality of chicken carcasses at modern Poultry plant. The 3rd Scientific Conference,Faculty of Vet. Med., Benha University, 1-3 january.
123. Morrison, R.M. Economics of Food Irradiation: Comparison between Electron Accelerators and Cobalt-60. Int. J. Radiat. Appl. Instrum. Part 1990, 35, 673–679.
124. Shaltout, F.A. and Abdel Aziz, A.M. (2004): Salmonella enterica Serovar Enteritidis in Poultry Meat and their Epidemiology.Vet.Med.J., Giza,52(3):429-436.
125. Lima, F.; Vieira, K.; Santos, M.; de Souza, P.M. Effects of Radiation Technologies on Food Nutritional Quality; IntechOpen: London, UK, 2018; pp. 137–146.
126. Shaltout,F.A. and Abdel Aziz ,A.M.(2004): ESCHERICHIA COLI STRAINS IN SLAUGHTERED ANIMALS AND THEIR PUBLIC HEALTH IMPORTENCE. J.Egypt. Vet. Med. Association 64(2):7-21.
127. Shaltout,F.A., Amin, R., Marionet , Z., Nassif and Shimaa, Abdel-wahab(2014): Detection of aflatoxins in some meat products. Benha veterinary medical journal, 27(2) :368-374.
128. Marin, C.; Cerdà-Cuéllar, M.; González-Bodi, S.; Lorenzo-Rebenaque, L.; Vega, S. Research Note: Persistent Salmonella Problem in Slaughterhouses Related to Clones Linked to Poultry Companies. Poult. Sci. 2022, 101, 101968.
129. Shaltout,F.A. and Afify , Jehan Riad,EM and Abo Elhasan , Asmaa,A.(2012): Improvement of microbiological status of oriental sausage. Journal of Egyptian Veterinary Medical Association 72(2):157-167.
130. Castell-Perez, M.E.; Moreira, R.G. Irradiation and Consumers Acceptance. Innov. Food Process. Technol. A Compr. Rev. 2021, 2, 122–135.
131. Shaltout,F.A. and Daoud, J. R.(1996): Chemical analytical studies on rabbit meat and liver. Benha Vet. Med.J.8 (2):17-27.
132. Chun, H.H.; Kim, J.Y.; Lee, B.D.; Yu, D.J.; Song, K.B. Effect of UV-C Irradiation on the Inactivation of Inoculated Pathogens and Quality of Chicken Breasts during Storage. Food Control 2010, 21, 276–280.
133. Shaltout,F.A. and Edris, A.M.(1999): Contamination of shawerma with pathogenic yeasts. Assiut Veterinary Medical Journal,40(64):34-39.
134. .Shaltout, F. A.; Eldiasty , E. and Mohamed , M.S.(2014): Incidence of lipolytic and proteolytic fungi in some chicken meat products and their public health significance. Animal Health Research Institute: First International Conference on Food Safety and Technology 19-23 June 2014 Cairo Egypt pages 79-89.
135. Ehlermann, D.A.E. Particular Applications of Food Irradiation: Meat, Fish and Others. Radiat. Phys. Chem. 2016, 129, 53–57.

136. Shaltout, F.A.; Eldiasty, E. ; Salem, R. and Hassan, Asmaa (2016): Mycological quality of chicken carcasses and extending shelf – life by using preservatives at refrigerated storage. Veterinary Medical Journal -Giza (VMJG)62(3)1-7.
137. Shaltout, F.A.; Salem, R. Eldiasty, E.; and Diab, Fatema. (2016): Mycological evaluation of some ready to eat meat products with special reference to molecular chacterization. Veterinary Medical Journal -Giza 62(3)9-14.
138. Sedeh, F.M.; Arbabi, K.; Fatolahi, H.; Abhari, M. Using Gamma Irradiation and Low Temperature on Microbial Decontamination of Red Meat in Iran. Indian J. Microbiol. 2007, 47, 72–76.
139. .Shaltout, F. A.; Elshater, M. and Wafaa, Abdelaziz (2015): Bacteriological assessment of street vended meat products sandwiches in Kalyobia Governorate. Benha Vet. Med.J.28 (2):58-66.
140. 1Madoroba, E.; Magwedere, K.; Chaora, N.S.; Matle, I.; Muchadeyi, F.; Mathole, M.A.; Pierneef, R. Microbial Communities of Meat and Meat Products: An Exploratory Analysis of the Product Quality and Safety at Selected Enterprises in South Africa. Microorganisms 2021, 9, 507.
141. Shaltout, F. A.; Gerges, M.T. and Shewail, A.A. (2018): Impact of Organic Acids and Their Salts on Microbial Quality and Shelf Life of Beef. Assiut veterinary medical journal 64(159): 164-177
142. Shaltout,F.A.;Ghoneim, A.M.; Essmail, M.E. and Yousseif ,A.(2001): Studies on aflatoxin B1 residues in rabbits and their pathological effects. J.Egypt. Vet. Med. Association 61(2):85-103.
Shaltout,F.A. and Hanan , M.T. El-Lawendy (2003): Heavy Metal Residues In Shawerma. Beni-Suef Vet.Med.J. 13(1):213-224.
143. Monteiro, M.L.G.; Mársico, E.T.; Mano, S.B.; Teixeira, C.E.; Canto, A.C.V.d.C.S.; Carvalho Vital, H.; Conte-Júnior, C.A. Influence of Good Manufacturing Practices on the Shelf Life of Refrigerated Fillets of Tilapia (Oreochromis Niloticus) Packed in Modified Atmosphere and Gamma-irradiated. Food Sci. Nutr. 2013, 1, 298–306.
144. Shaltout, F.A. and Hashim, M.F. (2002): Histamine in salted, Smoked and Canned Fish products. Benha Vet. Med.J.13 (1):1-11.
145. Shaltout, F.A.; Hashim. and Elnahas,s.(2015): Levels of some heavy metals in fish (tilapia nilotica and Claris lazera) at Menufia Governorate. Benha Vet. Med.J.29 (1):56-64.
146. Shaltout,F.A. and Ibrahim, H.M.(1997): Quality evaluation of luncheon and Alexandrian sausage. Benha Vet. Med.J.10 (1):1-10.
147. Karkas, J.; Mohácsi-Farkas, C. History and Future of Food Irradiation. Trends Food Sci. Technol. 2011, 22, 121–126.
148. Shaltout, F.A.; Nassif, M and Shakran, A (2014): Quality of battered and breaded chicken meat products. Global Journal of Agriculture and Food Safety Science – 1(2) ISSN 2356-7775.
149. Shaltout,F.A., Amani M. Salem, A. H. Mahmoud, K. A (2013): Bacterial aspect of cooked meat and offal at street vendor's level. Benha veterinary medical journal, 24(1): 320-328.
150. C Reygaert,W. An Overview of the Antimicrobial Resistance Mechanisms of Bacteria. AIMS Microbiol. 2018, 4, 482–501.
151. Shaltout,F.A. and Salem, R.M.(2000):Moulds, aflatoxin B1 and Ochratoxin A in Frozen Livers and meat products.Vet . Med. J.Giza 48(3):341-346.
152. Yasser H. Al-Tarazi, A. Al-Zamil, Shaltout FA. and H. Abdel-Samei (2002). Microbiological status of raw cow milk marketed in northern Jordan. AVMJ Volume 49 Issue 96 Pages 180-194
153. Bonomo, L. A Critical Analysis Risk Assessment: Food Irradiation: Pro or Con? ESSAI 2006, 4, 8. Available online: https: //dc.cod.edu/essai/vol4/iss1/8 (accessed on 30 March 2023).
154. Shaltout FA, Zakaria IM and Nabil ME.(2018): Incidence of Some Anaerobic Bacteria Isolated from Chicken Meat Products with Special Reference to Clostridium perfringens. Nutrition and Food Toxicology2(5):429-438.
155. Gunes, G.; Deniz Tekin, M. Consumer Awareness and Acceptance of Irradiated Foods: Results of a Survey Conducted on Turkish Consumers. LWT 2006, 39, 444–448.
156. Shaltout, F. A.; El-diasty, E.M. and Mohamed, M. S.(2014): Incidence of lipolytic and proteolytic fungi in some chicken meat products and their public health significance. 1st Scientific conference of food safety and Technology .2014, pp. 79-89.
157. Putri, M.S.; Susanna, D. Food Safety Knowledge, Attitudes, and Practices of Food Handlers at Kitchen Premises in the Port 'X' Area, North Jakarta, Indonesia 2018. Ital. J. Food Saf. 2021, 10, 9215.
158. Shaltout, F. A.; El-diasty, E.M.; Salem, R. M. and Asmaa, M. A. Hassan. 2016: Mycological quality of chicken carcasses and extending shelf -life by using preservatives at refrigerated storage. Veterinary Medical Journal – Giza ,62(3) :1-10.
159. Shaltout FA, R.M. Salem, E.M. El-Diasty and W.I.M. Hassan. 2019: Effect of Lemon Fruits and Turmeric Extracts on Fungal Pathogens in Refrigerated Chicken Fillet Meat. Global Veterinaria 21 (3): 156-160,
160. Shaltout FA, El-diasty, E, M.; Elmesalamy, M. and Elshaer, M. (2014): Study on fungal contamination of some chicken meat products with special reference to 2 the use of PCR for its identification. Conference, Veterinary Medical Journal – Giza vol. December 2014/12/17 vol.60 1-10.
161. Shaltout, F. A.; Salem, R. M; El-diasty, Eman and Fatema, A.H. Diab. (2016): Mycological evaluation of some ready to eat meat products with special reference to molecular characterization. Veterinary Medical Journal – Giza. 62(3): 9-14.
162. .Otoo, E.A.; Ocloo, F.C.K.; Appiah, V. Effect of Gamma Irradiation on Shelf Life of Smoked Guinea Fowl (Numida Meleagris) Meat Stored at Refrigeration Temperature. Radiat. Phys. Chem. 2022, 194, 110041.
163. Shaltout FA, Ahmed, A.A. Maarouf, Eman, M.K. Ahmed (2018): Heavy Metal Residues in chicken cuts up and processed chicken meat products. BENHA VETERINARY MEDICAL JOURNAL, 34(1): 473-483.
164. Shaltout, F.A.; Hanan M. Lamada, Ehsan A.M. Edris. (2020): Bacteriological examination of some ready to eat meat and chicken meals. Biomed J Sci & Tech Res., 27(1): 20461- 20465.
165. Sobhy, Asmaa and Shaltout, Fahim (2020): Prevalence of some food poisoning bacteria in semi cooked chicken meat products at Qaliubiya governorate by recent Vitek 2 compact and PCR techniques. Benha Veterinary Medical Journal 38 (2020) 88-92.
166. European Food Safety Authority. Scientific Opinion on the Efficacy and Microbiological Safety of Irradiation of Food. EFSA J. 2011, 9, 2103.
167. Sobhy, Asmaa and Shaltout, Fahim (2020): Detection of food poisoning bacteria in some semi-cooked chicken meat products marketed at Qaliubiya governorate. Benha Veterinary Medical Journal 38 (2020) 93-96.
168. Shaltout, F.A. (2024): Abattoir and Bovine Tuberculosis as A Reemerging Foodborne Diseas. Clinical Medical Reviews and Report 6(1):1-7.
169. Shaltout, F.A. (2023): Viruses in Beef, Mutton, Chevon, Venison, Fish and Poultry Meat Products. Food Science & Nutrition Technology 8(4):1-10.

170. Yemmireddy, V.; Adhikari, A.; Moreira, J. Effect of Ultraviolet Light Treatment on Microbiological Safety and Quality of Fresh Produce: An Overview. Front. Nutr. 2022, 9, 871243.