

# Did you know what are the hazards arising from the food Packaging?

Fahim Aziz Eldin Shaltout

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

**\*Correspondence Author:** Fahim Aziz Eldin Shaltout, Food Control Department, Faculty of Veterinary Medicine, Benha University, Egypt.

**Received Date:** June 17 2025 **Accepted Date:** July 01, 2025 **Published Date:** July 25, 2025.

**Citation:** Eldin Shaltout FA, (2025), Did you know what are the hazards arising from the food Packaging? *Clinical Research and Clinical Reports*, 8(2); DOI:10.31579/2835-8325/178

**Copyright:** © 2025, Fahim Aziz Eldin Shaltout This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Abstract

The safety of packaging materials used in meat products is a growing concern due to the potential for chemical migration and toxicological risks to consumers. This paper explores the sources of toxicity associated with packaging materials, the mechanisms of migration into meat products, health implications, and regulatory responses. It also highlights the need for continued innovation in safe, biodegradable alternatives and calls for comprehensive toxicological assessments of new packaging technologies.

**Key words:** safety; packaging materials; biodegradable; packaging technologies

## Introduction

Packaging serves as a crucial component in the meat industry, providing a barrier against contamination, improving shelf life, and aiding in product presentation (1-7). However, various chemical substances used in packaging materials can migrate into meat products, raising concerns about their potential toxicological effects on human health (31-37). Migration is influenced by several factors such as storage conditions, packaging composition, and the physicochemical properties of the meat (118-124).

### Sources of Toxicity in Packaging Materials

Several components of synthetic packaging materials have been identified as potential sources of toxicity (132-138). Plasticizers, Compounds like phthalates and bisphenol A (BPA), commonly found in polyvinyl chloride (PVC) and polycarbonate materials, can migrate into fatty meat products (8-15). Residual monomers and additives, Materials such as styrene (used in polystyrene) and formaldehyde (used in melamine resins) are known to leach under specific storage conditions (16-23). Heavy metals, Contaminants such as lead and cadmium, often found in inks or adhesives used in multilayer packaging, pose significant health hazards when they migrate into food (24-30). Nanomaterials, while nanotechnology offers enhanced barrier and antimicrobial properties (139-144), there is growing concern about the unknown long-term toxic effects of nanoparticles used in active and intelligent packaging (111-117).

### Factors Affecting Migration

The extent of chemical migration into meat products depends on Fat content, Lipophilic contaminants preferentially accumulate in fatty tissues, making high-fat meats more susceptible (38-45). Temperature and time, Elevated temperatures and prolonged storage enhance diffusion of packaging chemicals (46-53). Mechanical integrity, Poor-quality or damaged packaging accelerates degradation and leaching (54-60).

### Health Risks

The migration of toxic substances from packaging into meat can lead to Endocrine disruption (125-131), BPA and phthalates mimic hormones, potentially disrupting human endocrine function (61-67). Carcinogenicity, Substances like styrene are classified as possible human carcinogens (68-74). Neurotoxicity and organ damage, Chronic exposure to heavy metals can affect renal and neurological function (75-81). Allergic responses, Certain migrants may trigger immunological reactions in sensitive individuals (82-88). Regulatory Framework, Regulatory agencies such as the European Food Safety Authority (EFSA) and the U.S. Food and Drug Administration (FDA) enforce migration limits for packaging materials through established testing protocols (89-96). The focus is shifting toward greener packaging alternatives and the use of biodegradable polymers like polylactic acid (PLA), which have lower toxicity risks (97-103). While packaging technology has significantly advanced the safety and shelf-life of meat products, the potential for chemical migration and associated health risks cannot be overlooked (104-110).

## Conclusion

Ongoing research and regulatory vigilance are essential, particularly with the introduction of novel materials like nanocomposites and smart packaging. A transition toward eco-friendly, non-toxic packaging is not only desirable but necessary for long-term consumer health and environmental sustainability.

## Conflicts of Interest

The author declares 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- Zhang, Y., Xu, X., Wu, K., et al. (2016). Potential health risk of heavy metals from meat consumption. *Science of the Total Environment*, 553, 454–460.
- 3- Abd Elaziz, O., Fatin S. Hassanin, Fahim A. Shaltout and Othman A. Mohamed (2021): Prevalence of Some Foodborne Parasitic Affection in Slaughtered Animals in Local Egyptian Abattoir. *Journal of Nutrition Food Science and Technology* 2(3): 1-5.
- 4- 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.
- 5- Tawfik, M. S., & Huyghebaert, A. (1998). Polystyrene cups and containers: Styrene migration. *Food Additives and Contaminants*, 15(5), 592–599.
- 6- 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.
- 7- 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.
- 8- 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 .
- 9- 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.
- 10- Siracusa, V., Rocculi, P., Romani, S., & Rosa, M. D. (2008). Biodegradable polymers for food packaging: a review. *Trends in Food Science & Technology*, 19(12), 634–643.
- 11- 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
- 12- 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
- 13- 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.
- 14- Muncke, J. (2009). Exposure to endocrine disrupting compounds via the food chain: Is packaging a relevant source? *Science of the Total Environment*, 407(16), 4549–4559.
- 15- 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 JOURNAL* 41(2): 38-40.
- 16- 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.
- 17- Siracusa, V., Rocculi, P., Romani, S., & Rosa, M. D. (2008). Biodegradable polymers for food packaging: a review. *Trends in Food Science & Technology*, 19(12), 634–643.
- 18- Rubin, B. S. (2011). Bisphenol A: an endocrine disruptor with widespread exposure and multiple effects. *Journal of Steroid Biochemistry and Molecular Biology*, 127(1-2), 27–34.
- 19- 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.
- 20- Shaltout, F. A. (2024). Egyptian Medicinal Plants and Respiratory Disease. *Journal of Agriculture and Education Research*. 2 (3), 1-7.
- 21- 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.
- 22- Hassanin, F. S; Shaltout,F.A. and , Mostafa E.M(2013): Parasitic affections in edible offal. *Benha Vet. Med.J.25* (2):34-39.
- 23- 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.
- 24- Shaltout FA. Dry-Aged Meat and their Importance. *Open J of Frail Sci* 2024, 2(1): 000111. DOI: 10.23880/oajfs-16000111
- 25- Khattab, E.,Fahim Shaltout and Islam Sabik (2021): Hepatitis A virus related to foods. *BENHA VETERINARY MEDICAL JOURNAL* 40(1): 174-179.
- 26- Shaltout, F. A. Human Parasites in Relation to Contaminated Food and Drinking Water. *J Biomed Sci Biotech Res*. 2024. 2(1): 1-5.
- 27- 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.
- 28- Shaltout FAE. Everything about Nutritional Value of the Meat Ingredients and How we can Reduce its Microbial Hazards. *J Vet Sci Res* 2025, 10(1): 000283.
- 29- Saif,M. , Saad S.M. , Hassanin, F. S; Shaltout FA, Marionette Zaghoul (2019): Molecular detection of enterotoxigenic *Staphylococcus aureus* in ready-to-eat beef products. *Benha Veterinary Medical Journal* 37 (2019) 7-11.
- 30- Saif,M. , Saad S.M. , Hassanin, F. S; Shaltout, F.A., Marionette Zaghoul (2019); Prevalence of methicillin-resistant *Staphylococcus aureus* in some ready-to-eat meat products. *Benha Veterinary Medical Journal* 37 (2019) 12-15.
- 31- Farag, A. A., Saad M. Saad<sup>1</sup>, Fahim A. Shaltout<sup>1</sup>, Hashim F. Mohammed (2023 a): Studies on Pesticides Residues in Fish in Menofia Governorate. *Benha Journal of Applied Sciences*, 8(5): 323-330.
- 32- Shaltout, F. A. (2024): The concept of meat analysis in economy and public health, Dietary Nourishment and Food Processing Techniques (DNFPT) 1(1) 1-7,
- 33- Farag, A. A., Saad M. Saad<sup>1</sup>, Fahim A. Shaltout<sup>1</sup>, Hashim F. Mohammed (2023 b): Organochlorine Residues in Fish in Rural Areas. *Benha Journal of Applied Sciences* 8 (5): 331-336.
- 34- 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.
- 35- 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.

- 36- 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.
- 37- Arvanitoyannis, I. S., & Bosnea, L. (2004). Migration of substances from food packaging materials to foods. *Critical Reviews in Food Science and Nutrition*, 44(2), 63–76.
- 38- 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.
- 39- Shaltout, F.A., Thabet, M.G. and Koura, H.A. (2017). Impact of Some Essential Oils on the Quality Aspect and Shelf Life of Meat. *J Nutr Food Sci.*, 7: 647.
- 40- Shaltout, F.A. Islam Z. Mohammed<sup>2</sup>, 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.
- 41- Shaltout, F.A.,Islam, Z. Mohammed<sup>2</sup>, 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.
- 42- 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.
- 43- 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.
- 44- Shaltout, F.A. (2019): Poultry Meat. *Scholarly Journal of Food and Nutrition* 22 1-2.
- 45- Shaltout, F.A. (2019): Food Hygiene and Control. *Food Science and Nutrition Technology* 4(5): 1-2.
- 46- Cao, X. L. (2010). Phthalate esters in foods: sources, occurrence, and analytical methods. *Comprehensive Reviews in Food Science and Food Safety*, 9(1), 21–43.
- 47- 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.
- 48- Shaltout, D. E. (2024): Additives Extend the Food Shelf Life by Addition of Preservatives Nitrate, and Nitrite to Food, Dietary Nourishment and Food Processing Techniques, 1(3): 1-12.
- 49- 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.
- 50- Shaltout, F. A. E (2024): Using of Meat Diets as a Functional Food, Dietary Nourishment and Food Processing Techniques, vol 1(3): 1-14
- 51- Shaltout, F. A. (2024) Evaluation of Hazards in food, *Journal of Medical Discoveries*, 1(1);1-8
- 52- 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.
- 53- Shaltout, F. A (2024): Through a light on Meat as Functional food, *International Journal of Nursing Didactics*, 14 (08): 1-12. DOI: <https://doi.org/10.52845/IJND/2024/14-08-1>
- 54- 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.
- 55- Shaltout F. (2019) Microbial Contamination of Beef and Beef Products. *J. Nutrition and Food Processing*, 2(2): 1
- 56- Chaudhry, Q., Castle, L., & Watkins, R. (2008). Nanotechnologies in food packaging: regulatory and safety considerations. *Food Additives and Contaminants*, 25(3), 241–258.
- 57- 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.
- 58- Shaltout. F. A. (2024): Abattoir and Bovine Tuberculosis as a Reemerging Foodborne Disease. *Biomed J Sci & Tech Res* 54(3)-2024. BJSTR. MS.ID.008545.
- 59- 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.
- 60- Shaltout, F. A. E. (2024): Good News about Application of Advanced Methods in Food Examination, Dietary Nourishment and Food Processing Techniques, vol 1(3): 1-9.
- 61- Saad S.M., Shaltout, F.A., Nahla A Abou Elroos<sup>2</sup> and Saber B El-nahas (2019): Incidence of *Staphylococci* and *E. coli* in Meat and Some Meat Products. *EC Nutrition* 14.6 (2019).
- 62- Shaltout, F. A. E. (2024): Our options to improve food safety and quality by using preservatives which are used in food processing and preservation, *Dietary Nourishment and Food Processing Techniques*, vol 1(3): 1-16. DOI: 10.9567/3064-7061/WSJ.95.
- 63- 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.
- 64- 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).
- 65- 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.
- 66- 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.
- 67- 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,
- 68- 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
- 69- 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.
- 70- Shaltout FA, Ahmed A A Maarouf and Mahmoud ES Elkhoully. (2017): Bacteriological Evaluation of Frozen Sausage. *Nutrition and Food Toxicology* 1.5; 174-185.
- 71- EFSA (2016). Safety assessment of substances used in food contact materials. *European Food Safety Authority Journal*, 14(1), e04523.

- 72- 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.
- 73- 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.
- 74- 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.
- 75- 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.
- 76- Shaltout, F. A. (2024): Whey We Extend the Food Shelf Life by Aid of Natural Antioxidants? *Biomed J Sci & Tech Res* 59(1)-2024. BJSTR. MS.ID.009235
- 77- 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.
- 78- 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.
- 79- FDA (2020). *Food Ingredients and Packaging Terms*. U.S. Food and Drug Administration.
- 80- 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).
- 81- Shaltout 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.
- 82- 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.
- 83- Shaltout FA, Mohamed, A.Hassan and Hassanin, F. S(2004): THERMAL INACTIVATION OF ENTEROHAEMORRHAGIC ESCHERICHIA COLI O157:H7 AND ITS SENSITIVITY TO NISIN AND LACTIC ACID CULTURES. 1st Ann. Confr., FVM., Moshtohor, Sept, 2004.
- 84- Shaltout FA, Mohammed Farouk; Hosam A.A. Ibrahim and Mostafa E.M. Afifi.2017: Incidence of Coliform and Staphylococcus aureus in ready to eat fast foods. *BENHA VETERINARY MEDICAL JOURNAL*, 32(1): 13 - 17, MARCH, 2017.
- 85- 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.
- 86- Jarup, L. (2003). Hazards of heavy metal contamination. *British Medical Bulletin*, 68(1), 167–182.
- 87- 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.
- 88- Fattore, E., Fanelli, R., Dellatte, E., Turrini, A., & di Domenico, A. (2008). Assessment of the dietary exposure to phthalates in Italy. *Food and Chemical Toxicology*, 46(10), 3577–3583.
- 89- 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.
- 90- 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.
- 91- 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.
- 92- 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 characterization. *Veterinary Medical Journal -Giza* 62(3)9-14.
- 93- 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.
- 94- Shaltout, F. A. Gerges, M.T. and Shewail, 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
- 95- IARC (2002). *Styrene. Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 82. International Agency for Research on Cancer.
- 96- Shaltout, F.A; Hashim, M.F. 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
- 97- Shaltout, F.A. and Ibrahim, H.M. (1997): Quality evaluation of luncheon and Alexandrian sausage. *Benha Vet. Med.J*.10 (1):1-10.
- 98- 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.
- 99- 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.
- 100- 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):429-438.
- 101- 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.
- 102- 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.
- 103- 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,
- 104- Shaltout FA, El-diasty, E, M.; Elmeslamy, 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.
- 105- 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.
  - 106- 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.
  - 107- 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.
  - 108- 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.
  - 109- Shaltout, F. A. (2024): Good Idea on Preservatives and the Natural Preservatives and Meat Preservation Against the Foodborne Pathogens and the Spoilage Microorganisms. Biomed J Sci & Tech Res 57(5)-2024. BJSTR. MS.ID.009067.
  - 110- 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.
  - 111- Shaltout, F.A. (2024): Abattoir and Bovine Tuberculosis as A Reemerging Foodborne Diseases. Clinical Medical Reviews and Report 6(1):1-7.
  - 112- Shaltout, F.A. (2023): Viruses in Beef, Mutton, Chevron, Venison, Fish and Poultry Meat Products. Food Science & Nutrition Technology 8(4):1-10.
  - 113- Shaltout, F. A. (2024): Human Salmonellosis Acquired through the Food". Acta Scientific Pharmaceutical Sciences 8. (3): 1-6: 12-17
  - 114- Elkholy, R. A; Hussein, M. N; Abou El-Roos, N. A. and Shaltout, F.A.E. (2025) Enhancing Microbiological and Histological Quality of Frozen Turkey Meat Using Vinegar. Egyptian Journal of Veterinary Sciencespp 1-8. DOI: 10.21608/EJVS.2024.291707.2118
  - 115- Shaltout, F. A. (2024): Availability, Price, Tradition, Religion, Income, Social, Development and Economic Influences on Meat Consumption. Med J Clin Trials Case Stud 2024, 8(2): 000370
  - 116- Mohamed Q. M., Fahim A. Shaltout, f.A. and Ali, E.A. (2025): Multidrug-Resistant Bacteria from Raw Chevron and Mutton Meat. Egyptian Journal of Veterinary Sciences pp 1-8.
  - 117- Shaltout, F. A. E; Ab delazez Ahmed Helmy Barr, Mohamed Elsayed Abdelaziz. (2024) Pathogenic Microorganisms in Meat Products. Biomed J Sci & Tech Res 41(4)-2022. BJSTR. MS.ID.006623.
  - 118- Mohamed Q. M., Fahim A. Shaltout, f.A. and Ali, E.A. (2025): Bacteriological Quality Profiles and Prevalence of Staphylococcus aureus, Salmonella Species, and E. coli in Meat Samples of Sheep and Goats. Egyptian Journal of Veterinary Sciences pp 1-7.
  - 119- Ibrahim, S. M.; Hassanin, F. S.; Abou-Elroos, N. S. and Shaltout, F.A (2025): Quantifying The antimicrobial Efficacy of Selected Herbal Essential Oils Against Bacteria in Simulated Beef Steak Conditions. Egyptian Journal of Veterinary Sciences, pp 1-9.
  - 120- Shaltout, F. A. (2024): The Availa bility, the Price, the Tradition, the Reli gion, the Income, the Social, the Develop ment and the Economic Influences on the Meat Consumption. Biomed J Sci & Tech Res 55(4)-2024. BJSTR. MS.ID.008734.
  - 121- Ibrahim, S. M.; Hassanin, F. S.; Abou-Elroos, N. S. and Shaltout, F.A (2025): Evaluating The impact of Certain Herbal Essential Oils on The Shelf Life and Chemical Composition of Beef Steak. Egyptian Journal of Veterinary Sciences, pp. 1-8.
  - 122- Shaltout, F. A. (2024): Our Opinion on Using of Irradiation in Food Preservation and Production. Journal of Medical and Clinical Case Reports, 1(6): 1-9.
  - 123- Anees, K. P; El-diasty, E. M. and Shaltout, F. A. (2023): Mycological Evaluation and Occurrence of Aflatoxins and Ochratoxin A in Tilapia Oreochromis niloticus Fish and Fish Products. Journal of Advanced Veterinary Research ,13(7):1381-1385.
  - 124- AMR, A. K; HASSANIN, F. S.; HASSAN, M. A. and SHALTOU, F. A. E. (2024): TRIALS TO ESTIMATE AND CONTROL THE RESIDUAL LEVELS OF HETEROCYCLIC AROMATIC AMINES IN MEAT PRODUCTS. Assiut Vet. Med. J., 70 (182): 98-105.
  - 125- Shaltout, F. A.; Mohammed, I.; Afify, E. A. (2020): Detection of E. coli O157 and Salmonella species in some raw chicken meat cuts in Ismailia province, Egypt. Benha Veterinary Medical Journal 39(2): 101-104.
  - 126- Hassanin, F. S.; Shaltout, F. A.; Maarouf, A. A.; El-Sisy, S. F.; Ahmed, A. E. (2020): Bacteriological profile of frozen chicken meat cuts at Qalubiya governorate markets. Benha Veterinary Medical Journal 39 (2) 1-5.
  - 127- 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 Veterinary Medical Journal 40 (42) 12-16.
  - 128- Shaltout, F. (2024) Application of Irradiation in Food Preservation and Production. Journal of Pathology Research Reviews & Reports. SRC/JPR-190. 6(5): 1-8.
  - 129- Taha, S. T.; Shaltout, F. A.; Shima, N. Edris, S. N.; Mohamed, E. Nabil, M. E. (2024): Effect of lavender oil, clove oil and frankincense extract on sensory and microbial properties of raw drumsticks in refrigerator. Benha Veterinary Medical Journal 46 (1) 135-139.
  - 130- Shaltout, F. A.; Salem, R. M; Eldiasty, E. M and Diab, F. A. (2023): Experimental Study on the Effect of Propionibacterium and Acetic acid on Candida albicans contamination in chicken fillet Stored at Chilling Conditions. Benha Veterinary Medical Journal 43 (2) 91-96.
  - 131- Mubarak, S. R.; Abou EL-Roos, N. A.; Hussein, M. N. and Shaltout, F. A. E. (2024): Comparative microbiological evaluation between fresh and frozen bovine liver. Benha Veterinary Medical Journal 47 (1) 99-102.
  - 132- El Asely,
  - 133- ty, 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.
  - 134- Shaltout, S. and Shaltout,F. (2024), "Food Borne Bacterial Diseases Due to Consumption of Meat, Fish and Poultry Products", Arch Health Sci; 8(1): 1-8.
  - 135- Shaltout, F. A. (2024): Our Opinion on Using of Irradiation in Food Preservation and Production. Journal of Medical and Clinical Case Reports 01 | (6): 1-9
  - 136- Hakeem, K. P.; El-diasty, E. M.; Shaltout, F. A. E. (2023): Effects of natural compounds of some plants on microbial contamination and sensory qM. M. ; Fath Elbab, G. F.; Shaltout, F. A. E.(2024): Antibiotic Residues in Commercially Available Freshwater and Marine Fish: A

- Risk Assessment. Egyptian Journal of Aquatic Biology & Fisheries, 28(1): 397 – 410.
- 137- El Asely, M. M.; Fath Elbab, G. F. and Shaltout, A. E. (2025): Impact of Freezing Intervals on Oxytetracycline and Ciprofloxacin Residues in Nile Tilapia and Catfish Muscles. Egypt. J. Vet. Sci. Vol. 56, No. 7, pp. 1419-1424.
- 138- Elkholy, R. A.; Abou EL-Roos, N. A.; Hussein, M. N. and Shaltout, F. A. E. (2025): Differential Microbiological Quality on Marketed Frozen Turkey Breast and Thigh Meat. Egypt. J. Vet. Sci. 56, (1), pp. 1-10.
- 139- Shaltout, F. A. (2024): THE FOOD ADDITIVES USED IN FOOD PRODUCTION, ADVANTAGES AND DISADVANTAGES. World Journal of Internal Medicine and Surgery 1(6): 1-17
- 140- Shaltout, F. A. (2024): Right Methods to Extend the Meat Shelf- Life by Using of Natural Preservatives and Their Public Health Importance. Journal of Medicine Care and Health Review 1(2): 1-17.
- 141- 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.
- 142- Shaltout, F. A. (2024): Importance of Extending the Shelf Life of the Meat. Journal of Medical and Clinical Case Reports 01 | (9): 1-10.
- 143- Shaltout, F. A. E., Mona N. Hussein, Nada Kh. Elsayed (2023): Histological Detection of Unauthorized Herbal and Animal Contents in Some Meat Products. Journal of Advanced Veterinary Research (2023) 13(2): 157-160.
- 144- Shaltout, F. A. (2023): Abattoir and Bovine Tuberculosis as A Reemerging Foodborne Disease. Clinical Medical Reviews and Reports 6(1): 1-7
- 145- Shaltout, F. A., Ramadan M. Salem, Eman M. Eldiasuality of fish fillet during refrigeration. Benha Veterinary Medical Journal 45 (1) 152-156.

**Ready to submit your research? Choose ClinicSearch and benefit from:**

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

**At ClinicSearch, research is always in progress.**

Learn more <https://clinicsearchonline.org/journals/clinical-research-and-clinical-reports>



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.