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The Concept of Meat Analysis in Economy and Public Health

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Abstract:

As a consequence of the meat market globalization, the production and manufacture of meat products is at a stage of innovative dynamics as meat contains an abundance of proteins with high biological Value, meat is an excellent diet source of essential amino acids. Consumers demand high quality and convenient meat products, with natural flavour and taste, and very much appreciate the fresh appearance of minimally processed meat. To harmonize or to blend all these demands without compromising safety, it is necessary to implement new preservation technologies in the meat industry and in the meat industry. Meat treatment and processing may include protein extraction, chemical and enzymatic treatments, massaging or tumbling, curing, stuffing, canning, smoking, and other related preliminary preparations, such as meat particle size reduction and mixingof meat with various additives. It is noteworthy that simple handling of fresh meat in retail stores and in homes is generally excluded from the definition of meat processing. By controlling the amount of salt, sugar, nitrate/nitrite, and other ingredients, as well as the curing, dehydration, and maturation times, and proper packaging and storage conditions, these products can be highly acceptable, fairly stable, and safe. The principles behind these techniques are being revealed by the various scientific studies on the effect of ingredients and processing methodology used in the preparation of these products.

Key Words: processed meat, meat treatment, flavor, taste

INTRODUCTION:

Meat is important to the meat industry and to economies and cultures around the world. There are nonetheless people who choose to not eat meat (vegetarians) or any animal products (vegans), for reasons such as taste preferences, ethics, environmental concerns, health concerns or religious dietary rules. It is mainly composed of water, protein, and fat. It is edible raw, but is normally eaten after it has been cooked and seasoned or processed in a variety of ways. Unprocessed meat will spoil or rot within hours or days as a result of infection with, and decomposition by, bacteria and fungi (1,2,3,4,5 and 6). There is Three Main Meat Categories, Red Meat, all livestock is considered red meat. This includes beef, pork, goat, and lamb. Poultry, commonly referred to as white meat, poultry includes chicken and turkey. Seafood, that includes fish, as well as crustaceans, like crab and lobster, and molluscs, like clams, oysters, scallops, and mussels. Red meat which include Beef, Pork and Mutton Meat including their sensory characters ,composition and the examinations could be done on them (7,8,9,10,11 and 12).

A-The Sensory or organoleptic characters of meat:

A-1-Meat colour(13,14,15,16 and 17):

-Beef meat is Bright cherry red in color. Mutton meat is Light red to brick red. Pork meat is Greyish pink in colour.

A-2-Meat Odour(18,19,20,21 and 22):

The raw meat of Freshly Slaughtered Cattle is characterized by a very weak odour . Mutton meat is faint or goaty. Pork is urine like in odour.

A-3-Meat texture and meat consistency(23,24,25,26 and 27):

-Beef Meat is coarse with marbling appearance. Mutton meat is firm with Inter muscular fat present. Pork meat is soft in texture, free of surface waterines with S/C and Intramuscular.

The attributes to be evaluated are (appearance, colour, texture and consistency, smell and taste.) Texture and consistency (tenderness and juiciness).

The meat prepared for the consumer should be tender and juicy. Meat tenderness depends on: the animal species from which the meat originates. Lamb, pork and poultry meat are sufficiently tender after slaughter but beef requires a certain period of maturation to achieve optimal eating quality.Texture and consistency, including juiciness are

an important criterion, still neglected by many consumers, for the eating quality of meat.Often consumers do not know that the eating quality of meat can be upgraded by ripening, especially in the case of beef and similar meats. There is also a great deal of consumer negligence in how to prepare meat. It should be cooked to become sufficiently tender, but cooking should not be too intense otherwise the meat becomes dry, hard and with no juiciness.The texture of meat is influenced by the cook time and temperature. A correlation between meat texture and heat-induced denaturation of meat proteins has been reported for beef. The texture is of less importance in meat products, such as cured or canned products, sausages, etc., because they are either made of comminuted meat and/or meat which has undergone heat treatment or long maturation periods and will therefore generally be tender. Heat on meat will also change its water holding capacity (WHC). Meat generally contains 75% water. At high temperatures greater than 55o, myofibrillar proteins denature and coagulate causing shrinkage of fibres and tightening of the myofilaments. This results in an increase in evaporation and drip loss and a much drier meat texture that is less juicy and tender. The texture of cooked meat therefore depends on the combination of intrinsic factors as water loss, collagen content and denaturation of myofibrillar proteins and extrinsic factors as cooking time and temperature.

A-3-1-Techniques used For Estimation of meat Texture (28,29,30,31,32 and 33):

Sensory: The simple way to check the consistency of meat is by chewin . Although this test seems easy, in practice it is rather complicated. Taste panelists need experience, particularly when the different samples have to be ranked, for example which sample is the toughest, the second toughest or the most tender.

Instrumental methods: are mechanical tests that measure the applied resistance of the meat to a force acting on it.

B-Meat Sample preparation (34,35,36,37,38,39 and 40):

-Fresh coarse ground beef was obtained from a local meat retailer and immediately transported to the laboratory and prepared for testing, must be examined as soon as possible.

-NaL and NaCl are the salts used for treatment of the ground beef. Ground meat was divided into four batches (2 kg each), which formulated to contain either NaL (30 g/kg), NaCl (30 g/kg), combination of NaL+NaCl (20 g+20 g/kg), or no additives (control). Salts were added to meat (w/w) on wet weight basis, and since aqueous solution of NaL was used, all other meat batches were formulated to contain the same amount of water. Salts were thoroughly mixed into the ground meat by hand, reground through a 0.3-cm grinder plate, and divided into 100-g samples. Each sample was vacuum-packaged in a polyethylene bags, labeled, and stored at 2°C. Ground beef was sampled at 3 days intervals during 21 days storage for microbiological and chemical analyses.

C-The Microbiological analyses:

C-1-Aerobic plate count (APC) (41,42,43,44,45 and 46):

Determined by inoculating 0.1 ml of the sample homogenate, at selected dilutions, onto duplicate sterile plates of pre-poured and dried Standard Method Agar using the surface spread technique, then the plates were incubated for 48 h at 35°C.

C-2-Psychrotrophic count (47,48,49,50,51,52 and 53):

Determined in a similar method to that for APC except that plates were incubated at 7°C for 10 days.

C-3-Lactic acid bacteria (54,55,56,57,58 and 59):

The diluted samples were plated on deMan, Rogosa, and Sharpe (MRS) agar and incubated at 30°C for 2–3 days in an anaerobic jar with disposable Anaerocult C bags for the generation of an anaerobic medium.

C-4-Enterobacteriaceae count (60,61,62,63,64,65 and 66):

1 ml of the appropriate dilution was inoculated by the pour-plated method on violet red bile agar and overlaid with approximately 5 ml of the same growth medium, then the plates were incubated at 35°C for 24 h.

D-The Chemical Analysis of meat:

D-1-The Nutritive Value of meat(67,68,69,70,71 and 72):

The nutritive value includes: proteins, fats, carbohydrates, vitamins and minerals.

Beef meat is: 21.5% protein, 69.5% Moisture, 8.0% Fat, 1.0% Ash, 70 mg/100g Cholesterol, 160 Kcal Energy. Mutton meat is: 19.5% protein, 71.5% Moisture, 7.0% Fat, 1.5% Ash, 70 mg/100g Cholesterol, 145 Kcal Energy. Pork meat is: 19.5% protein, 60.5% Moisture, 9.5% Fat, 1.0% Ash, 70 mg/100g Cholesterol, 170 Kcal Energy.

Meat is Rich in lysine content, 8 Essential AA- phenylalanine, valine, tryptophan, threonine, methionine, leucine, isoleucine, lysine. Good source of Iron an essential nutrient for maintaining good health. Meat is rich in Vitamin B12, Vitamin D.

D-1-1-Fat content of meat (94,95,96,97,98,99 and 100):

-Before storage, fresh ground beef was analysed for its fat content.

D-2-Meat Keeping quality tests:

D-2-1-Detection of Total Volatile Nitrogen in meat (73,74,75,76,77 and 78):

Direct methods. Biogenic amines are commonly determined using chromatography colorimetric or combined methods, such as gas chromatography-mass spectrometry.

TVB-N determination measures the concentration of ammonia, TMA, and DMA and is

perceived as a reflection of the level of protein decomposition and therefore quality deterioration of meat

Indirect/rapid methods. For the determination of TVB-N Unlike conventional methods used for the determination of TVB-N, noninvasive and nondestructive methods have attracted much interest due to their high reliability, being used directly on the sample without the need to conduct sample preparation, and because of their fast and simultaneous determination of several properties. Several technologies have been reported for this purpose, including computer vision, infrared spectroscopy. Due to the high interest in the biological effects of TVB-N and TMA on the quality of meat products and on health, a new generation of rapid methods of determination have been proposed Many of these methods have been described as inexpensive, safe, rapid, and nondestructive options for rapid detection of TVB-N and unsafe levels of bacteria spoilage. Since loss in meat quality due to bacterial activity also causes changes in the internal and external physicochemical attributes they collect information on changes in multiple properties, which could provide a better strategy for the measurement of freshness. Therefore, sensors that are capable of detecting certain substances and products of biochemical/microbial activities have been developed to measure the freshness of meat .

D-2-2-Thio Barbituric Acid detection (79,80,81,82,83,84,85 and 86):

Thio Barbituric Acid as an Index of Oxidative Rancidity in Muscle meat the most common chemical measurement of lipid oxidation in meat is the thiobarbituric acid (TBA) assay. The widespread use of the Thio Barbituric Acid assay is primarily due to its simplicity. However, the Thio Barbituric Acid test may pose many challenges due to its relative nonspecificity and varying sensitivity. These problems can negate any

advantages of simplicity, and can lead to a misinterpretation of results unless the factors which influence the TBA reaction are thoroughly accounted and understood. The Thio Barbituric Acid assay is based on the reaction between Thio Barbituric Acid and carbonyls to form red, fluorescent adducts under acidic conditions. The Thio Barbituric Acid assay can be conducted on ground muscle, muscle extracts, and muscle distillates; and adduct formation can be conducted under a number of varying temperature (25 to 100o C) and time (15 min to 20 hr) protocols.

D-2-3-Meat PH measurement (87,88,89,90,91,92 and 93):

-Ten grams of sample were homogenized with 40 ml distilled water in a blender for 30 s. The homogenate was filtered and the pH value of the filtrate was determined using a digital pH meter standardized at pH 4 and 7.

Tools for Measuring pH.

Mandatory Tools:

- pH meter. □ Electrode(s) (aka probe or sensor) (if not integrated or included with meter).
- Electrode fill solution (for re-fillable electrodes). □ Calibration buffer solutions.

Cleaning solution(s) □ Storage solution □ Deionized/Distilled water □ KimWipes.

D-2-4-Lipid oxidation measurement (101,102,103,104,105 and 106):

-Determined by the Thio Barbituric Acid assay. Ground beef (10 g) was mixed with 25 ml of trichloroacetic acid (TCA) solution and homogenized in a blender for 30 s. After filtration, 2 ml of the filtrate were mixed with equal amount of aqueous solution of Thio Barbituric Acid (3 g/l) in a test tube. The tubes were incubated at room temperature in the dark for 20 h; then the absorbance was measured at 532 nm using UV-vis spectrophotometer. Thio Barbituric Acid value was expressed as mg malonaldehyde per kg of meat.

D-3-Chemical Residues in Meat:

-A residue is defined as a substance having a pharmacological action and of a conversion products thereof and other substances transmitted to meat and which are likely to be dangerous to human health.

D-3-1-Antibiotics residues in meat(107,108,109,110,111 and 112):

-They produce unsightly lesions when administered by injection. The sight of the injection is discolored, and may be hemorrhagic if treatment was administered shortly before slaughter. In many of these cases the antibiotic is still present in an unmetabolized form. Long standing injection sites, particularly those incorporate an oily base, may be hard fibrous nodules within a muscle. During meat inspection all carcasses with injection sites should be retained and judgments made according to case history, the time of treatment and laboratory results. Frequently, there is no history of previous therapy, so the best evidence on which to base a judgment is the visual appearance of the lesion and the laboratory result.

-Antibiotics may interfere with further meat processing if this depends on fermentation reaction. They may cause allergic reactions in sensitized consumers. A small number of antimicrobials are suspected of having carcinogenic properties. There is also considerable concern regarding the creation of resistant bacteria in farm animals which may then pass to the consumer

D-3-2-Hormonal residues in meat (113,114,115,116,117 and 118):

-Hormones have been used for a variety of therapeutic and growth –modifying purposes in animals.They may be associated with cancer. The most commonly cited example is diethylstilbestrol therapy given to pregnant mothers with threatened miscarriages. A significant proportion of girls born after this therapy subsequently developed cervical adenocarcinomas.

D-3-3-Pesticides residues in meat (119,120,95,96,97,98 and 99):

Pest control chemicals must be toxic to some living organisms to fulfill their role. Depending on the pest being controlled they may be termed insecticides, fungicides, etc. The insecticides that are directly applied to food animals and the anthelmintics are regarded as the most important subgroups: The chlorinated hydrocarbons, They are frequently more toxic in small amounts as their biological activity is greater.

D-3-4-Heavy metal residues in meat (5,6,7,8,9,10 and 11):

Excess intakes of heavy metals in meat have caused many intoxications in man. These are most often caused by contaminated cereals or by accidental additions during processing but occasionally toxic concentrations occur in animal tissues and products. These can be associated with soils naturally high in the element or through environmental contamination from local industry. They may also occur from feeding grain treated with the toxic metal or from excess amounts remaining in the environment following previous use in paints, etc. These toxic chemicals are detected by atomic absorption spectrometry.

Lead: Lead can accumulate in the tissues of animals grazing close to smelting plants or in animal ingesting paints or substances with high lead contents. During chronic exposure the metal accumulates in the bones but in more acute exposure the highest values are found in the liver and kidney.

Arsenic: is the second most important poisonous hazard for farm animals. They may be exposed to inorganic or organic arsenic compounds when they are given feed, forage or liquid contaminated with arsenical herbicides, rodenticides or insecticides. Chronic toxicity can occur when arsenical compounds are fed at low levels because the metal accumulates in the liver, kidney and bones.

Mercury: It has been most frequently associated with feeding to animals seed grain treated with mercury –containing dressings to prevent fungal growth.

Cadmium: In farm animals the greatest concentrations occur in kidney and liver. Kidney mal-function in man begins when the concentrations are above 200 ug/g wet weight.

Copper: The metal tends to be accumulated in liver and kidney. Other metals such as fluorine and selenium.

D-3-5-Mycotoxin□ residues in meat(115,116,117,118,119 and 120):

Products of toxigenic moulds growing in meat and meat products.

Aflatoxins are produced by Aspergillus flavus and Aspergillus parasiticus. There are four major types of toxins labeled AFB1, AFB2, AFG1 and AFG2. AFB1 is the most commonly produced and the most toxic. Liver, kidney and milk are considered to be the most vulnerable to residue accumulation. Ochratoxins are produced by some Penicillium spp. and some Aspergillus strains. Ochratoxin A is the most common and the most toxic to birds, mammals and fish. The kidney is the site for the presence of these toxins and they can be detected by a range of commercially –produced immunoassay KITS, and if positive animals are identified, they should be retained on a toxin-free diet for 4 weeks prior to slaughter to ensure that the levels in kidney have decreased.

Conclusion:

Meat is an important source of nutrition for people. Now a days, it also

gives livelihood

pportunities for farm families, processor and other people who are directly or non-directly involved in meat or meat Products processing. Consumer, industry and governments need up-to-date information on how meat and meat products can contribute to human nutrition and meat processing industry development can best contribute to increasing food security and alleviating poverty.

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- 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.

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 Loacal Egyptian Abottoir. 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- 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.

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- 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

11- 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 .

12- 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.

13- Edris, A.M.; Shaltout, F.A. and Arab, W.S. (2005): Bacterial Evaluation of Quail Meat. Benha Vet. Med.J.16 (1):1-14.

14- 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.

15- 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.

16- 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 benha , Egypt.

17- 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.

18- 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.

19- 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.

20- Hassan M, Shaltout FA* and Saqur N (2020): Histamine in Some Fish Products. Archives of Animal Husbandry & Dairy Science 2(1): 1-3.

21- Hassan, M.A and Shaltout, F.A. (2004): Comparative Study on Storage Stability of Beef, Chicken meat, and Fish at Chilling Temperature. Alex.J.Vet.Science, 20(21):21-30.

22- 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.

23- 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.

24- 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.

25- 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.

26- 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.

27- 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.

28- Hassanin, F. S; Shaltout,F.A. and , Mostafa E.M(2013): Parasitic affections in edible offal. Benha Vet. Med.J.25 (2):34-39.

29- 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.

30- Khattab, E.,Fahim Shaltout and Islam Sabik (2021): Hepatitis A virus related to foods. BENHA VETERINARY MEDICAL JOURNAL 40(1): 174-179..

31- 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..

32- 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.

33- 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.
34- 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.
35- 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.
36- 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.
37- 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.
38- 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.
39- 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.
40- 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.
41- 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.
42- 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.
43- 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..
44- 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.
45- Shaltout, F.A.(2019): Poultry Meat. Scholarly Journal of Food and Nutrition 22 1-2..
46- Shaltout, F.A.(2019): Food Hygiene and Control. Food Science and Nutrition Technology 4(5): 1-2.
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- 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.
49- 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.
50- 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.
51- 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.
52- 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.
53- 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).
54- 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.
55- 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).
56- 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.
57- Shaltout and Abdel-Aziz, 2004: Salmonella enterica serovar Enteritidis in poultry meat and their epidemiology. Vet. Med. J. Giza, 52 (2004), pp. 429-436.
58- 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.
59- 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,
60- 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
61- 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.
62- Shaltout FA, Ahmed A A Maarouf and Mahmoud ES Elkhouly. (2017): Bacteriological Evaluation of Frozen Sausage. Nutrition and Food Toxicology 1.5 ; 174-185.
63- 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.
64- 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.
65- 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.
66- 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.
67- Saad, S.M. and Shaltout, F.A.(1998):Mycological Evaluation of camel carcasses at Kalyobia Abattoirs. Vet.Med.J. Giza,46(3):223-229.
68- 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.
69- 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.

70- 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).
71- 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.
72- Shaltout FA, Ahmed A A Maarouf and Mahmoud ES Elkhouly.(2017): Bacteriological Evaluation of Frozen Sausage. Nutrition and Food Toxicology 1.5 (2017): 174-185.
73- 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.
74- 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.
75- 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.
76- shaltout, F.A.(2002): Microbiological Aspects of Semi-cooked chicken Meat Products. Benha Veterinary Medical Journal13,2,: 15-26.
77- 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.
78- 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.
79- 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.
80- 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.
81- Shaltout, F.A.(1996): Mycological And Mycotoxicological profile Of Some Meat products. Ph.D.Thesis, Faculty of Veterinary Medicine, Moshtohor, Zagazig University Benha branch.
82- Shaltout, F.A. (1998): Proteolytic Psychrotrophes in Some Meat products. Alex. Vet. Med. J.14 (2):97-107.
83- Shaltout, F.A.(1999): Anaerobic Bacteria in Vacuum Packed Meat Products. Benha Vet. Med.J.10 (1):1-10.
84- Shaltout,F.A.(2000):Protozoal Foodborne Pathogens in some Meat Products. Assiut Vet. Med. J. 42 (84):54-59.
85- Shaltout,F.A.(2001): Quality evaluation of sheep carcasses slaughtered at Kalyobia abattoirs. Assiut Veterinary Medical Journal, 46(91):150-159.
86- Shaltout, F.A.(2002): Microbiological Aspects of Semi-cooked Chicken Meat Products. Benha Vet.Med.J. 13(2):15-26.
87- Shaltout, F.A. (2003): Yersinia Enterocolitica in some meat products and fish marketed at Benha city.The Third international conference Mansoura 29-30 April.
88- 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.
89- 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.
90- 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.
91- 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.
92- 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.
93- Shaltout,F.A. and Daoud, J. R.(1996): Chemical analytical studies on rabbit meat and liver. Benha Vet. Med.J.8 (2):17-27.
94- Shaltout,F.A. and Edris, A.M.(1999): Contamination of shawerma with pathogenic yeasts. Assiut Veterinary Medical Journal,40(64):34-39.
95- 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.
96- 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.
97- 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.
98- 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.
99- 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
100- 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.
101- Shaltout,F.A. and Hanan ,M.T. El-Lawendy (2003): Heavy Metal Residues In Shawerma. Beni-Suef Vet.Med.J. 13(1):213-224.
102- Shaltout, F.A. and Hashim, M.F. (2002): Histamine in salted, Smoked and Canned Fish products. Benha Vet. Med.J.13 (1):1-11.
103- 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 .
104- Shaltout,F.A. and Ibrahim, H.M.(1997): Quality evaluation of luncheon and Alexandrian sausage. Benha Vet. Med.J.10 (1):1-10.
105- 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.
106- Shaltout,F.A., Amani M. Salem, A. H. Mahmoud, K. A(2013): Bacterial aspect of cooked meat and offal at street vendors level .Benha veterinary medical journal, 24(1): 320-328.
107- 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.
108- 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 49(96):180-194
109- 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.

110- 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.
111- 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.
112- 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,
113- 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.
114- 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.
115- 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.
116- 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.
117- 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.
118- 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.
119- Shaltout, F.A.(2024): Abattoir And Bovine Tuberculosis as A Reemerging Foodborne Diseas. Clinical Medical Reviews and Report 6(1):1-7.
120-Shaltout, F.A.(2023): Viruses in Beef, Mutton, Chevon, Venison, Fish and Poultry Meat Products. Food Science & Nutrition Technology 8(4):1-10.