

<b>CONTENTS</b>	<b>Page</b>
<b>1. INTRODUCTION :</b>	1
<b>2. REVIEW OF LITERATURE:</b>	4
2.1. Incidence of the microbial contamination in turkey and Ostrich meat.	4
2.2. Source of microbial contamination.	18
2.3. Public health significance.	25
<b>3. MATERIAL AND METHODS:</b>	34
3.1. Collection of Samples.....	34
3.2. Bacteriological examination. ....	34
3.2.1. Preparation of the samples.....	34
3.2.2. Determination of total aerobic count.....	34
3.2.3. Determination of total anaerobic counts.....	35
3.2.4. Determination of <i>coliforms</i> .....	35
3.2.5. Determination of total <i>Staph.aureus</i> count.....	36
3.2.6. Enumeration of <i>C. perfringens</i> count.....	36
3.2.7. <i>Enterobacteriaceace</i> count.....	37
3.2.8. Isolation and identification of <i>E.coli</i> .....	40
3.2.9. Isolation and identification of <i>salmonella</i> .....	42
3.2.10. Detection of Enterococci.....	44
3.2.11. Isolation and identification of <i>C. perfringens</i> .....	46
<b>4. RESULTS</b>	51
<b>5. DISCUSSION:</b> .....	70
<b>6. CONCLUSIONS AND RECOMMENDATION:</b> .....	81
<b>7. SUMMARY:</b> .....	84
<b>8. REFERENCES:</b> .....	87
<b>9. ARABIC SUMMARY:</b> .....	--

## LIST OF ABBREVIATIONS

Abbreviation	Definition
<b>APHA</b>	American Public Health Association.
<b>CFU</b>	Colony forming unit
<b>FAO</b>	Food and Agriculture Organization.
<b>ICMSF</b>	International Commission on Microbiological Specification for foods.
<b>/g</b>	Per gram.
<b>EOS</b>	Egyptian Organization of Standardization.
<b>USDA-FSIS</b>	United States Department of Agriculture Food Safety and Inspection Services.
<b>CMT</b>	California Mastitis Test
<b>APEC</b>	Avian pathogenic E. coli
<b>E.</b>	Escherichia
<b>EHEC</b>	Enterohaemorrhagic E. coli
<b>EMB</b>	Eosin methylene blue agar
<b>ETEC</b>	Enterotoxigenic Escherichia coli
<b>HUS</b>	Haemolytic ureamic syndrome
<b>LD<sub>50</sub></b>	Lethal dose which kills 50% of inoculated animals.
<b>MR</b>	Methyl red
<b>PCR</b>	Polymerase chain reaction
<b>TSI</b>	Triple sugar iron
<b>UV</b>	Ultraviolet
<b>VP</b>	Voges Proskauer



## **6- CONCLUSIONS AND RECOMMENDATIONS.**

Contamination of turkey and ostrich carcasses may render not only unfit for human consumption but also may increase human risk. Such contamination may be occurred throughout initial processing, packaging and storage until the product is sufficiently cooked and consumed.

Living ostrich and turkey arriving at the processing plant harbor a heavy load of microorganism; some of these microorganisms are pathogenic to human being.

The high microbial loads found in this study suggested that an improvement of the microbiological quality of retail ostrich meat is convenient the microbiological safety of ostrich and turkey meat should be considered by the sanitary legalization, as safety controls should include limits that permit establishing the alimentary danger in commercialization of this alternative meat.

The following measures are suggested to reduce or even eliminate the microbial contamination, thus improve the quality of the turkey and ostrich meat and its products. Moreover, to safeguard the consumer from being exposed to food illness or food poison outbreaks which may be result from consumption of contaminated turkey and ostrich meat.

- 1- Strict hygienic precautions should be recommended during Slaughtering, scalding, packaging and evisceration.



- 2- Slaughter houses should be hygienically constructed and supplied with good equipment and utensils easily cleaned and disinfected.
- 3- Using a good vaccination programs to prevent occurrence of diseases.
- 4- Periodical testing of birds in the farm for the food – borne pathogens especially salmonella (blood testing)
- 5- Apparently diseased birds should not be sent to the slaughtering plant.
- 6- Ante -mortem inspection should be applied before slaughtering.
- 7- Instruments used in slaughtering should be periodically cleaned and disinfected.
- 8- Water used in processing should be potable water and periodically renovated in scalding and cooling tanks, otherwise the tanks will be considered as source of contamination.
- 9- Antimicrobial as chlorine, trisodium phosphate and lactic or acetic acids must be used in washing, scalding and cooling water to reduce contamination.
- 10- Examination and cleanliness of workers are necessary as well as hand washing facilities must be present.
- 11- Post-mortem examination should be done with great attention to detect diseased cases.
- 12- Periodical sanitation of turkey and ostrich slaughter halls, utensils, Equipment, chilling rooms and freezing cold stores.



- 13- Starting or improving a public information campaign and educating the public.
- 14- Training programs for food industry personnel, personnel who deal with food and food-borne outbreaks.
- 15- Control of hygienic measures in supermarkets, restaurants, and processing plants by the responsible authorities.
- 16- Development of methods used for diagnosis of pathogens in foods and the associated facilities.
- 17- Control programs for insects, flies and rodents, in processing plants.
- 18- Holding of ready-to-eat bird's meat open air in streets or transportation on non-chilling vehicles in most Egypt markets must be prevented and kept away from the different sources of contamination.
- 19- Encouragement of researches and increasing them and benefit from these researches.
- 20- A medical certificate for personnel dealing with food with periodical renovation of certificate.



## 7. SUMMARY

Seventy five samples of fresh poultry meat were collected from different shops in Cairo.

Fifty samples were turkey meat and 25 were ostrich meat [the represented samples were from different parts of the carcasses].

Regarding to the bacterial counts,. the present study revealed that the mean values of aerobic plate count (APC) /g for both turkey and ostrich meat samples were  $8.5 \times 10^5 \pm 6.2 \times 10^5$  and  $1.2 \times 10^5 \pm 3.5 \times 10^4$ , respectively .

The mean value of total *anaerobic count* /gm for both turkey and ostrich meat were  $3.8 \times 10^3 \pm 1.2 \times 10^3$  and  $4.9 \times 10^3 \pm 6.4 \times 10^2$ , respectively.

The mean values of total *coliforms count* / g for both turkey and ostrich meat samples were  $1.6 \times 10^2 \pm 10$  and  $47 \pm 11$  respectively and the mean value of *staphylococcus aureus* count /g were  $8.4 \times 10 \pm 4.6 \times 10$  and  $1.3 \times 10^2 \pm 5.1 \times 10$  for turkey and ostrich meat samples respectively.

The *Clostridium perfringens* count / g with a mean value  $6.0 \times 10 \pm 2.8 \times 10$  and  $4.3 \times 10^2 \pm 7.7 \times 10$  for both turkey and ostrich meat samples respectively .

The mean value of total *Enterobacteriaceae* count /g for both turkey and ostrich meat samples were  $9 \times 10^3 \pm 8.0 \times 10^3$ ,  $5.9 \times 10^2 \pm 8.06 \times 10$  respectively.



In case of Enterococci count /g the mean value were  $9.6 \times 10^2 \pm 8.0 \times 10^2$  and  $1.6 \times 10^2 \pm 3.2 \times 10$  for both turkey and ostrich respectively.

Concerning isolation of *coliform* microorganisms , were isolated from turkey meat samples in a percentage of 10 , 24 , 36 ,24 ,30 ,2 , 6 and 4 for , *Citrobacter farmeri*, *Citrobacter freundii*, *E.coli*, *Enterobacter cloacae* , *Enterbacter aerogens* , *Klebsiella oxytoca*, *Klebsiella pneumonii* and *Klebasiella ozaenae* , respectively. While *Enterobacter agglumerans* couldn't be isolated.

In case of ostrich meat samples the percentage of isolated *Coliform* were 4, 8 , 12 , 32 , 28 , 16 and 12 for, *Citrobacter farmeri*, *Citrobacter freundii*, *E.coli*, *Enterobacter cloacae* , *Enterbacter aerogens* , *Enterobacter agglumerans* and *Klebsiella pneumonii* respectively while , *Klebsiella oxytoca* and *klebsiella ozaenae* couldn't be isolated .

*Enterobacteriaceae* isolated from turkey meat samples were identified as *Proteus vulgraris* , *Proteus mirabilis*, *Proteus morgani`* , *Provedecia reltgeri* , *Salmonella typhimurium* and *Serratia marcesescens* in a percentage of 34 , 28 , 22 , 10 , 2 and 6 respectively while *Enterobacteriaceae* isolated from ostrich meat samples were identified as *Proteus valgaris* , *Proteus mirabilis* and *Proteus morgani* in a percentage of 48 , 12 and 28 respectively but *Provedencia reltgeri* , *Salmonella typhimurium* and *Serratia marcesescens* couldn't be identified.



The serotypes of isolated *E.coli* from turkey meat were identified as O<sub>78</sub> : K<sub>80</sub> : H<sup>-</sup> : O<sub>88</sub> : H<sup>25</sup> and O<sub>2</sub> :K<sub>1</sub> :H<sup>-</sup> in a percentage of 10 , 6 and 4 respectively while 16% of isolated *E. coli* strain were untypable

In case of ostrich meat samples the isolated *E. coli* were serotypes as O<sub>2</sub> : K<sub>1</sub> : H<sup>-</sup> and O<sub>119</sub> : K<sub>69</sub> in a percentage of 8 and 4 respectively .

The isolated *Salmonella* from turkey meat samples were serotypes as *S. typhimurium*.

*Enterococci* isolated from turkey meat samples were identified as *E. faecalis* and *E. faecium* with a percentage of 46 and 20 respectively and their percentage were 60 and 24 respectively from ostrich meat samples.

*C. prefringens* were isolated from turkey meat samples in a percentage of 4, 6 and 2, respectively, for *C. prefringens* type A ,B and C. and in case of ostrich meat samples the percentage were 8 and 4, respectively for *C.perfringens* type B and C , respectively, while *C. prefringens* type A couldn't be isolated.

The significance of isolated organisms as well as suggested hygienic measures was discussed.