



Bacteriological Quality and Isolation Some Pathogenic Bacteria from Some Meat Products Sold In Some Local Markets of West Libya (Alzawi, Surman, Sabratha and Algelat)

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Abstract This study was aimed to evaluate the bacteriological quality and isolation some pathogenic bacteria from some meat products sold in some local markets of West Libya (Alzawi, surman, sabratha and Algelat) .5 samples of minced meat, beef burger, and sausage were collected from each city subjected to bacteriological analysis. Isolation and identification of some pathogenic and Public Health Hazard bacterial groups (*salmonella*, *E.coli* and *staphylococcus*) were carried out. The obtained results indicated that minced meat has the highest contamination level compared with the other products. The mean values of total bacterial count isolated from minced meat, beef burger and sausage samples were 6×10^8 , 3.1×10^5 and 5.6×10^4 CFU/g, respectively. *Escherichia coli* were detected in 50 % of the examined minced meet samples and 30% of beef burger but not found in sausage samples. Salmonella were isolated from 20 % of minced meat sample and 10% of Beef burger at levels of 6×10^4 and 4×10^2 CFU/ g, respectively. Data also showed that 20% of minced meet samples and 10% of beef burger samples were contaminated with *Staphylococcus aureus* at levels of 3×10^3 , 4×10^2 and 2×10^2 CFU/g, respectively.

Key words: meat contamination , meat microbial-isolation of bacteria.

الجودة البكتريولوجية وعزل بعض البكتيريا المسببة للأمراض من بعض منتجات اللحوم المباعة في بعض الأسواق المحلية في غرب ليبيا (الزاوية، صرمان، صبراتة والعجيلات)

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المخلص هدفت هذه الدراسة إلى تقييم الجودة البكتريولوجية وعزل بعض البكتيريا المسببة للأمراض من بعض منتجات اللحوم التي تباع في بعض الأسواق المحلية في غرب ليبيا (الزاوية، صرمان، صبراتة والعجيلات). تم جمع 5 عينات من اللحم المفروم، ولحوم البقر، والسجق من المدن موضوع الدراسة خضعت العينات للتحليل البكتريولوجي. تم إجراء العزل والتعرف على بعض المجموعات البكتيرية المسببة للأمراض وذات الخطورة على الصحة العامة (السالمونيلا وبكتيريا القولون والمكورات العنقودية) وذلك بمعامل مركز الرقابة على الأغذية فرع زوارة. أشارت النتائج التي تم الحصول عليها إلى أن اللحوم المفرومة كانت أعلى مستوى تلوث مقارنة بالمنتجات الأخرى. كانت القيم المتوسطة لإجمالي عدد البكتيريا المعزولة من اللحم المفروم وعينات برجر اللحم والسجق 6×10^8 ، 3.1×10^5 و 5.6×10^4 CFU/g على التوالي. تم الكشف عن الإشريشيا القولونية في 50% من عينات اللحم المفروم التي تم فحصها و30% من برغر اللحم البقري ولكن لم يتم العثور عليها في عينات النقانق. تم عزل السالمونيلا من 20% من عينة اللحم المفروم و10% من برغر اللحم البقري بمستويات 6×10^4 و 4×10^2 CFU/ g، على التوالي. أظهرت النتائج أيضاً أن 20% من عينات اللحم المفرومة و10% من عينات برجر اللحم البقري ملوثة بالمكورات العنقودية الذهبية بمستويات 3×10^3 ، 4×10^2 و 2×10^2 CFU/g على التوالي.

الكلمات المفتاحية: تلوث اللحوم -ميكروبات اللحم -عزل البكتيريا.

Introduction

Meat is a very important food to human health due to its composition; Meat is rich in high quality protein, fats, vitamins, minerals and trace elements, so that a huge number of people consume meat and meat products. Generally, meats are very susceptible to quality loss due to microbiological spoilage. The bad and improper processing, handling and storage of meat products lead to spoilage which rises to economic losses and public health hazard.

Meat and meat product such as minced meat are appreciated because of its convenience.

Unfortunately, their shelf- life is limited because the large exposed surface area facilitates spoilage. The rate of deteriorative change depends on meat composition, hygienic practices during cutting, grinding, and preparation, as well as storage conditions. The most important factor in controlling meat spoilage is microbial contamination and their growth, which affect safety and quality (4). Food safety experts, agree that pathogen reduction requires a farm to the table approach. Microbiological testing is designed to address improvements at the plant level, with the

understanding that additional initiatives at other points in the food production chain also are needed. USDA already has begun a number of projects to address these other points, including safe handling instructions for consumers, identification and trace back of animals, and the development of on-farm pathogen prevention models. FSIS established a series of baseline data collection programs to acquire information that provides general microbiological profiles of meat and poultry for selected

microorganisms that are of various degrees of public health concern (19). Baseline studies are also used to develop pathogen reduction performance standards that plans must meet earlier baseline studies (steer/heifer, cow/bull, broiler chicken, market hog, and young turkey) and surveys (raw ground beef, raw ground chicken, and raw ground turkey) included the following microbial analyses of *Escherichia coli*; *Clostridium perfringens*; *Staphylococcus aureus*; *Listeria monocytogenes*; *Campylobacter*; *Escherichia coli* O157:H7; and *Salmonella* (14). Although the total bacterial count was used in bacteriological examination to reflect the hygienic quality, however, it is evident that coliform group count is considered of much greater value in assessing its quality (7). *Salmonella* is now established, as one of the most important causes of food-borne illness at worldwide (17). The *Staphylococcal* genus contains at least 23 species, most important being *Staphylococcus aureus*. This organism is of major concern to the meat and poultry industries (16).

The purpose of the study was to assess the bacteriological quality for some meat products sold in some cities in western Libya and Isolation and identification of some pathogenic and health hazard bacterial groups was carried out.

Materials and Methods

Samples of meat products:

20 retail samples of minced meat, beef burger, and sausage (5 samples of each product collected from four sources of local market of Alzawi, Surman, Sabratha and Algelat (cities in west of Libya).

The analysis were done in microbiology Lab. Food & Drug control center - zware

Media used:

1-Media used for determination of total bacterial count:

Nutrient agar medium (American Public Health Association) (1, 6) was used for the determination of total bacterial count.

2-Media used for isolation of *Staphylococcus aureus*:

Manitol salt agar media and Vogel Jonson media were used to isolate *Staphylococcus aureus* according to (6)

3-Media used for isolation of coliform group bacteria:

Mac Conkey broth, Mac Conkey agar and Eosin methylene blue agar media were used for isolation and identification of coliform bacteria (*E. coli*) according to (6).

4-Media used for isolation *Salmonella*:

The salmonella - shigella - agar medium was used as selective plating

medium as described by (13).

Preparation of samples for bacteriological analysis:

Ten grams of each sample were mixed with 90 ml of sterile saline solution (9 g Na Cl/1L distilled water) under sterile conditions to give 1/10 dilution. Serial dilutions were prepared to be used for counting several types of bacteria.

Determination of total bacterial count:

The total bacterial count was determined using the plate counts technique on a nutrient agar medium according to procedures of (1) and (6). The plates were incubated at 37°C for 48 hrs.

Isolation of *Staphylococcus aureus*:

Staphylococcus aureus bacteria was determined according to the method described by (1 and 6) using Vogel Jonson medium plus 1 ml potassium tellurite solution 1% (w/v) to each 100 ml of sterilized medium which mixed well before pouring in the plates. The plates were incubated at 37°C for 24 hr.

Isolation of coliform bacteria:

Coliform group bacteria were determined using Mac Conkey agar medium according to the procedures described by (1 and 6). The plates were incubated at 37°C for 24 hr.

Isolation of *Salmonella*:

The presence or absence of *Salmonella* was determined according to the method described by (13). *Salmonella* - *Shigella* agar plates were incubated at 35°C for 24 hr. *Salmonella* appeared as black colonies, some of them with metallic sheen.

Results and Discussion

Total count bacteria in alzawia

Data presented in Table (1) illustrated the total count bacteria of minced meat of different sources (A1, A2, A3, A4, A5) were 10×10^8 , 2×10^8 , 8×10^8 , 8×10^8 and 5×10^8 respectively. The table showed that sample A1 is the highest contamination and sample A2 are the lowest contamination. That is meaning some of sources worked in safe conditions when compared. But generally the values are in agreement with those obtained by (14) found that the aerobic plate counts of two groups ground beef samples were 4.7×10^6 and 3.5×10^6 respectively. They concluded that microbiological quality of ground beef depends not only on size but also on length of storage time between grinding and use.) surveyed 124 delicatessen meat products for microbiological quality shortly after purchase and following storage at 22 degree for 24 h. They found that 34.3% of the samples contained aerobic plate count of 10^7 CFU per g and increased to 62.7% following storage.

(11) determined the microbiological quality for retail packages of frozen ground beef and kofta over a period of six months in Assiut and Cairo. The average total bacterial counts per gram were as follows: 6×10^7 CFU/g for frozen ground beef and 106 for frozen kofta. Also (18) found that the aerobic plate count in 555 samples of minced beef (in Berlin, Germany ranged from 2.7×10^3 to 9.3×10^6 CFU/g. The result obtained is disagree with Libyan Standard Specification.

Table (1) total bacterial count for minced meat in Alzawia

Sample	No. of samples	Total count
A1	5	10x10 ⁸
A2	5	2x10 ⁸
A3	5	8x10 ⁸
A4	5	8x10 ⁸
A5	5	5x10 ⁸
Total and average		6.6 x10⁸

A1-A2- A3-A4-A5= Minced meat from different sources in Alzawia

Total count bacteria in surman

Data presented in Table (2) illustrated the total count bacteria of minced meat of different sources (A1, A2, A3, A4, A5) were 8x10⁸, 3x10⁸, 6x10⁸, 8x10⁸ and 6x10⁸ respectively with average 6.2x10⁸. The table showed that sample A1 and A4 is the highest contamination and sample A2 are the lowest contamination. That is meaning some of sources worked in safe conditions when compared. Generally, the values are in agreement with those obtained by (3).the result show the all samples have high contamination and disagree with Libyan Standard Specification.

Table (2) Total bacterial count for minced meat in Surman

Sample	No. of samples	Total count
A1	5	8x10 ⁸
A2	5	3x10 ⁸
A3	5	6x10 ⁸
A4	5	8x10 ⁸
A5	5	6x10 ⁸
Total and average		6.2 x10⁸

A1-A2- A3-A4-A5= Minced meat from different sources in Surman

Total count bacteria in Sabratha

Data presented in Table (3) illustrated the total count bacteria of minced meat of different sources (A1, A2, A3, A4, A5) were 8x10⁸, 5x10⁸, 5x10⁸, 7x10⁸ and 5x10⁸ respectively with average 6x10⁸. The table showed that sample A1 is the highest contamination and the samples A2, A3 and A5 are the lowest contamination. That is meaning some of sources worked in unsafe conditions because the all samples have high contamination and disagree with Libyan Standard Specification. The result also show that, the values are in agreement with those obtained by (2), (11) and (3).

Table (3) Total bacterial count for minced meat in Sabratha

Sample	No. of samples	Total count
A1	5	8x10 ⁸
A2	5	5x10 ⁸
A3	5	5x10 ⁸
A4	5	7x10 ⁸
A5	5	5x10 ⁸
Total and average		6 x10⁸

A1-A2- A3-A4-A5= Minced meat from different sources in Sabratha

Total count bacteria in Al-agalat

As shown in table 4 all samples were total contaminated by bacteria .the result show the total count bacteria in the samples were 6x10⁸, 4x10⁸, 5x10⁸, 5x10⁸, 5x10⁸ respectively With average 5x10⁸. The obtained results are in agreement with those recorded by (20), They investigated microbial quality of 50 samples of luncheon and minced meat (25 samples of each). They showed that the minced meat has heavier bacterial load than luncheon samples and they traced this result to miss handling, improper hygienic measures during manufacturing and transportation and keeping methods as well as methods of exposure to sale. In addition, (22) examined 80 samples of minced meat, kofta, beef burger and luncheon (20 samples each) from different areas in Cairo and Giza. They found the aerobic plate counts for these previous products were 2.2 x 10⁶, 2.9 x 10³, 2 x 10⁵ and 1.3 x 10⁵, respectively. This result also agreement with (3) he investigated microbial quality of 200 samples of minced meat in Assuit city in Egypt his results show all samples were contaminated by bacteria. These results disagree with Libyan Standard Specification.

Table (4) Total bacterial count for minced meat in Al-agalat

Sample	No. of samples	Total count
A1	5	6x10 ⁸
A2	5	4x10 ⁸
A3	5	5x10 ⁸
A4	5	5x10 ⁸
A5	5	5x10 ⁸
Total and average		5 x10⁸

A1-A2- A3-A4-A5= Minced meat from different sources in Al-agalat

Total count bacteria for minced meat of different cities

The analysis show that, the minced meat obtained from **Al-zawia** was the highest contamination (6.6x10⁸). on the other hand , the minced meat obtained from **Al-gelat** was the lowest (5x10⁸).The result also show the total count bacteria of minced meat for Surman and Sabratha nearly same (6.2x10⁸ and 6x10⁸).In addition the result show all studied samples were contaminated by bacteria and disagree with Libyan Standard Specification..

Table (5) Total count bacteria for minced meat of different cities

City	Total count
Al-zawia	6.6x10 ⁸
Surman	6.2x10 ⁸
Sabratha	6x10 ⁸
Al-gelat	5x10 ⁸

Total count bacteria in some meat products

Data presented in Table (6) showed the total aerobic bacterial count isolated from minced meat, beef burger and sausage samples collected from different sources. The bacteriological analysis indicated that minced meat has the highest contamination level compared with the other products. The total count of aerobic bacteria

isolated from minced meat ranged from 5×10^6 to 10×10^8 with an average of 6×10^8 CFU/g. At the same time, the mean values of total bacterial count isolated from beef burger and sausage samples were 3.1×10^5 and 5.6×10^4 CFU/g respectively.

The obtained results are in agreement with those recorded by (20), They investigated microbial quality of 50 samples of luncheon and minced meat (25 samples of each). They showed that the minced meat has heavier bacterial load than luncheon samples and they traced this result to miss handling, improper hygienic measures during manufacturing and transportation and keeping methods as well as methods of exposure to sale. In addition, (22) examined 80 samples of minced meat, kofta, beef burger and luncheon (20 samples each) from different areas in Cairo and Giza. They found the aerobic plate counts for these previous products were 2.2×10^6 , 2.9×10^3 , 2×10^5 and 1.3×10^5 , respectively.

(8) reported that fresh minced meat tends to have a short shelf life because the quality of the raw ingredients is usually lower (i.e., has higher number of contaminating microorganisms), and is re-contaminated through the grinding /handling process. Mincing and grinding of meat at the retail location can introduce more spoilage microorganisms if proper equipment hygiene and handling measures are not followed. These results are agreement with (23) and (3).

Table 6. Total aerobic bacterial count (CFU/g) of meat products samples

Meat Products	No. of samples	Positive samples		Aerobic bacterial Count (CFU/g)		
		No.	%	Min.	Max.	Mean
Minced meat	20	20	100%	5×10^8	10×10^8	6×10^8
Beef burger	20	20	100%	3×10^4	6×10^5	3.1×10^5
Sausage	20	20	100%	3×10^3	8×10^4	5.6×10^4

Data in Table (7) showed that *E. coli* was detected in 50 % of the examined minced meet samples and 30% of beef burger samples. The average values of the contamination level with *E. coli* were 6×10^4 , 6×10^2 and 4×10^2 in the examined samples of minced meet and beef burger, respectively. On the other hand, *E. coli* couldn't detect in the examined sausage samples. Previous investigators found nearly similar results. (9) and (12), they detected *E. coli* in 47.37% and 28.3% of the examined minced meat and beef burger samples.

Table 7. Escherichia coli count (CFU/g) in meat products samples

Meat Products	No. of samples	Positive samples		<i>Escherichia coli</i> count		
		No.	%	Min.	Max.	Mean
Minced meat	50	25	50%	3×10^2	8×10^4	6×10^4
Sausage	50	0	0	-	-	-
Beef burger	50	15	30%	1×10^2	6×10^2	4×10^2

Fig. (1 and 2): Isolation of *E. coli* from meat products on Mac-Conkey agar and EMB agar media.



Fig. (1) : *E. coli* on Mac-Conkey agar give EMB Pink colonies

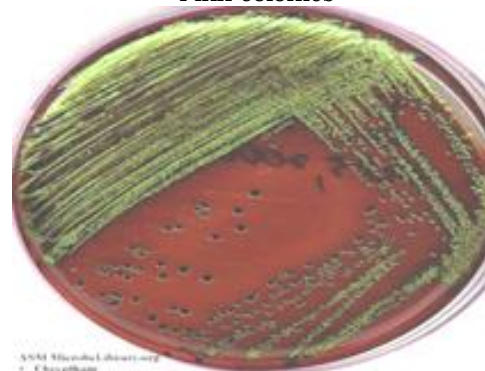


Fig. (2): *E. coli* on gives green metal shine

Table (8) clears that the incidence of *salmonella* in miced meat and Beef burger samples were 20 % and 10%, respectively, but not detected in Sausage. *Salmonella* counts ranged from 3×10^2 to 8×10^4 with mean value of 6×10^4 CFU/ g of minced meat, but only ranged from 1×10^2 to 6×10^2 with a mean value 4×10^2 CFU/ g of Beef burger. The obtained results were similar to some extent with that reported by (11), they found that the incidence of *Salmonella* in beef burger was 6% out of 50 samples and in frozen minced meat was 6% out of 50 tested samples and in fresh minced meat the percentage was 12%. In contrary, they failed to isolate *salmonella* from any of examined luncheon samples. *Salmonella* species were detected in 5% of the examined minced meat samples, but not found in any of the examined luncheon or kofta samples. (2) , (18), (23),

Table 8. Salmonella counts (CFU/g) in meat products samples

Meat Products	No. of samples	Positive samples		<i>Salmonella</i> counts		
		No.	%	Min.	Max.	Mean
Minced meat	20	4	20%	3×10^2	8×10^4	6×10^4
Sausage	20	0	0%	-	-	-
Beef burger	20	2	10%	1×10^2	6×10^2	4×10^2

Fig. (3 and 4): Isolation of *Salmonella* from meat products on Mac Conkey agar and Bismus sulphate agar media.

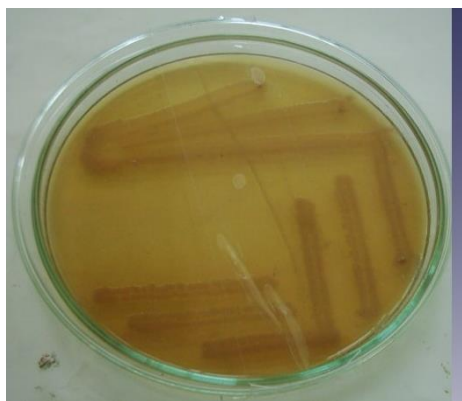


Fig.(3): pale yellow colonies of *Salmonella* on Mac. Agar

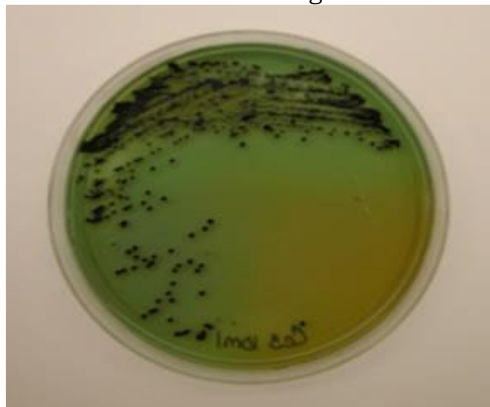


Fig.(4): black colonies of *Salmonella* on Bismut agar

Data presented in Table (4) indicated the incidence of *Staphylococcus spp.* in 10, 5, and 5 samples out of 50 analyzed samples of each of minced meat and beef burger but not in sausage samples. Minced meat showed the highest contamination level (3x 10³ CFU/g) Followed by beef burger (4x 10² CFU/g). (21) and (15) who detected *Staphylococcus* in 1.5% and 11.4% of the examined ground meat samples of the examined ground beef samples obtained nearly similar results. On the

Reference

- [1]- A.P. H. A. (1976). American public Health Association of Methods for the Microbiological Examination of Foods. Speck, M. L. ed., Washington, D. C., USA.
- [2]- Abd-El-Aziz,A.S., Neklawy,E.,Hussien,A. and Niazi,Z. (1996). Food poisoning microorganisms in some local meat products. Vet. Med. J. Giza, 41(4)691-698.
- [3]- Albie, A.A. (2016), Studies on bacteria of public health hazard isolated from some meat products.PH.D theses Food Science and Technology, Agriculture Faculty, Assuit University, Egypt.
- [4]- Brooks, J.; Alvarado, M.; Stephens, T.; Kellermeier, J.; Tittor, A. and Miller, M. (2008). Spoilage and safety characteristics of ground beef packaged in traditional and modified atmosphere packages. Journal of Food Protection, 71(2): 293-301.
- [8]- Doyle, M. P.; Beuchat, L. R. and Montville, T. J. (2007 Food Microbiology Fundamentals and Frontiers. Washington, DC: ASM Press.
- [5]- Chung, Y.H., Kim, S.Y. and Chang.Y.H. (2003). Prevalence and antibiotic susceptibility of salmonella isolated from foods in Korea from 1993 to 2001. Journal of Food Protection, 66(7):1154-1157.
- [6]- Difco-Manual, (1984). Dehydrated culture media and reagents microbiological and clinical laboratory procedures, Pub-Difco-Lab-Detroit Michigan, USA.
- [7]- Djenane, D.; Yangüela, J.; Amrouche, T.; Boubrit, S.; Bousaâd, N. and Roncalés, P. (2011). Chemical composition and antimicrobial effects of essential oils of *Eucalyptus globulus*, *Myrtus communis* and *Saturejahortensis* against *Escherichia coli* O157:H7 and *Staphylococcus aureus* in minced beef. Food Science and Technology, 22, 1046-1053.
- [9]- Duitschaever, C.L. (1977). Bacteriological evaluation of some lunched meats in the Canadian Retail Market. Journal of Food Protection, 40(6):382-384.

other hand, *Staphylococcus* had not been detected in beef burger or minced meat as reported (22), (2), (9), (5).(23) and the same result obtained by (3).

Table 4. *Staphylococcus* count (CFU/g) in meat product samples

Meat Products	No. of samples	Positive samples		Staphylococcus count		
		No.	%	Min.	Max.	Mean
Minced meat	20	4	20%	1x 10 ²	6x 10 ³	3x 10 ³
Sausage	20	0	0%	-	-	-
Beef burger	20	2	10%	2x 10	6x 10 ²	4x 10 ²

Fig. (5 and 6): Isolation of *Staphylococcus* from minced meat samples on Mannitol salt agar and blood agar media

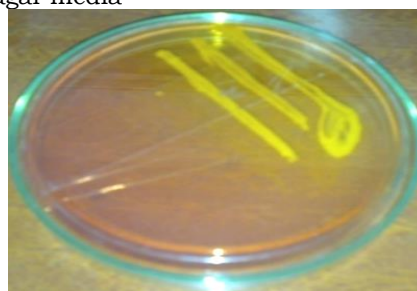


Fig.(5):yellow colonies of *Staphylococcus* on Mannitol salt agar pale



Fig.(6): B- haemolysis on blood agar with Clear zone around *Staphylococcus* colony

- [10]- Duffy, G., Cloak, O.M., Osullivan, M.G., Guillet, A., Sheridan, J.J., Blair, I.S. and McDowell, D.A. (1999). The incidence and antibiotic resistance profiles of salmonella spp. On Irish retail meat products. Food Microbiology, 16,623-631.
- [11]- El- Mossalami, E.E., Safwat, E.E., AbdelAziz, Laiela, A.S. and El-Sawah, H.(1989). Salmonellae in locally produced meat products. J. Egypt Vet. Med. Ass., 49(1-2) 99-108.
- [12]- Fathi,S.M. and Rashwan, M.A.(1992). Coliform, Enterobacteriaceas and total aerobic mesophilic counts in some selected meat products. Assiut Vet. Med. J., 27(54):121-129.
- [13]- FAO, (1979). Manuals of food-quality controls, 4, microbiological analysis. Food and Agriculture organization of the United Nations. Rome, PP. C9-12 and DI-33.
- [14]- Friedman, M.; Henika, P. R. and Mandrell, R. E. (2002). Bactericidal activities of plant essential oils and some of their isolated constituents against *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes*, and *Salmonella enterica*. J. of Food Protection 65, 1545-1560.
- [15]- Heredia, N., Garcia, S., Rojas, G. and Salazar, L. (2001). Microbiological condition of ground meat retailed in Monterrey, Mexico. Journal of Food Protection, 64(8) 1249-1251.
- [16]- Hannan, A.; Sidrah, S.; Chaudhary, S.; Barkaat, M. and Arshad, M. U. (2008). Antibacterial activity of *Nigella Sativa* against clinical isolates of Methicillinresistant *Staphylococcus aureus*. J. of Ayub Medical College, Abbottabad, 20.
- [17]- Hussien, S. M. (2006). Technological and biochemical studies on low fat meat products M. Sc. Thesis, Fac. of Agric., Minia Univ., Egypt
- [18]- Küplül, O., Sarimehmetoglu, B. and Oral, N. (2003). The microbiological quality of Cig Kofta in Ankara. Turk. J. Vet. Anim. Sci, 27:325-329.
- [19]- Mead, P.S.; Slutsker, L.; Detz, V.; McCaig, L.F.; Breese, J.S.; Shapiro, C.; Griffin, P.M. and Tauxe, R.V. (1999). Food related illness and dead in the United States. Emerging Infectious Diseases 5: 607-625.
- [20]- Mousa, M. M., Awad, H. A., Yassien, M.M. and Gouda,H.I.(1993). Microbial quality of some meat products. Vet. Med. J. Giza, 41(3): 59-62.
- [21]- Scanga, J.A., Bellinger, G.R., Belk, K.E. and Smith,G.C.(1999). Amicrobiological profile of domestic and imported beef rawmaterials distended for use in ground beef production. Beef Program report, Department of Animal sciences, Colorado State University.
- [22]- Tolba, K. (1994). Microflora in locally processed frozen meat, Vet. Med. J. Giza 42, (2): 99-105.
- [23]- Ragab, W.S.; Ehsan A.B. Hassan; and A.A. Albie (2016) Bacteriologica Quality of some Meat Products in the Egyptian Retail Markets. Assiut J.Agric.Sci. (47)No. (6-2)422-429 .Issn:1110-0486. E-Issn: 2356-9840