QUALITY OF BEEF AND EDIBLE OFFAL AT ABATTOIR LEVEL

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ABSTRACT

A total of 120 random samples of cattle shoulder meat, liver, kidneys and lungs (30 of each) were collected from two traditional abattoirs of Elbehira province. All collected samples were subjected to organoleptic, chemical and microbiological examinations to determine their quality. The results showed that the sensory characters (color, odor and consistency) and chemical parameters (pH with the mean of 5.70 ± 0.04, 6.45 ± 0.02, 6.49 ± 0.01, 6.48 ± 0.02, TVN with the mean of 12.68± 0.02, 13.06 ± 0.04, 12.76 ± 0.03, 12.98 ± 0.04 and TBA with the mean of 0.24 ± 0.01, 0.16 ± 0.01, 0.25 ± 0.01, 0.24 ± 0.01) for shoulder meat, liver, kidneys and lungs respectively were normal and accepted. On the other hand the results of microbiological examination in examined samples of shoulder meat, liver, kidneys and lungs revealed that the mean of total APC were 2.36×105 ± 48×103 , 20.1×104 ± 37×103,3.43×105 ±1.97×105 ,18.9×104 ±3.8×104, respectively. While the mean of *Enterobacteriaceae* count were 10.8×104 ± 2.6×104 , 84×103 ± 18×103 , 69×103 ± 17×103 , 84×103 ± 21×103, respectively, coliform count with the mean of 44×103±12×103, 34×103±7×103, 22×103±5×103, 32×103±8×103 respectively, total *Staphylococci* count with the mean of 28×103±5×103, 23×103±4×103, 23×103±5×103, 20×103±4×103 respectively, total mould with the mean of 1.24×102±0.64×102, 0.46×102±0.9×102, 0.49×102±0.1×102, 0.87×102±0.22 ×102, respectively and total yeast count with the mean of 2.59×102±1.41×102, 0.85×102±0.36×102, 0.23×102±0.07×102, 1.62×102 ± 0.8×102, respectively, were higher than the permissible limits and the examined samples failed to be accepted.

KEY WORDS: Shoulder meat, liver, kidneys, lungs, organoleptic examination, chemical examination, microbiological examination, abattoirs.

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1- INTRODUCTION

Fresh meat is highly perishable due to its biological composition. The slaughter of animals yields many edible products other than carcass meat (such as red offal), which are fit for human consumption. They are used either as prepared items (e.g. slices of liver) or used as ingredients in meat products. The market for 'edible by-products' differs with country (even region) and culture (Devatkl *et al.,* 2004). The intact tissues of healthy slaughtered animals are mostly sterile but the meat may be contaminated during slaughtering, handling, processing and storage from hands, workers, clothes, knives, hide, gut, fecal material on feet or from the environment. Microbial contamination of the carcass results in spoilage of meat, reduced shelf-life of meat and public health hazards (Phillips *et al.,* 2006) either due to presence of spoilage bacteria responsible for unfavorable changes or pathogenic bacteria leading to harmful effects as food infection or intoxication among consumers (Eley, 1992). Organoleptic, chemical and microbiological quality of fresh meat and edible offal have been receiving attention, all over the world, from researchers, food industry, health organization and governments due to the occurrence of significant outbreaks of food borne illness affecting consumers. Quality maintenance is important not only for consumer health

protection but also to assure uniformity in fresh meat shelf-life (Baumann-Popczyk and Sadkowska-Todays, 2012). So, the object of the current study was to evaluate the organoleptic, chemical and microbiological quality of cattle meat and edible offal at abattoir level.

2. MATERIAL AND METHODS:

2.1. Collection of samples:

A grand total of 120 cut samples of cattle shoulder meat and internal edible offal (liver, kidneys and lungs) (30 of each) were equally collected from 30 different cattle carcasses slaughtered in two different traditional abattoirs in El Behera governorate (15 carcasses from each abattoir). The samples were collected after complete stamping of slaughtered animals, and transferred to the laboratory in an insulated ice box under complete aseptic conditions, without undue delay for organoleptic, chemical and microbiological examinations.

2.2. *Organoleptic Examination:* color, odor and consistency (Morr-Mary, 1970).

2.3. Chemical Examination:

Determination of pH, TVN (FAO, 1980) and TBA (Kirk and Sawyers, 1991).

2.4. Microbiological Examination:

- Determination of APC, *Enterobacteriaceae*, coliform and total *Staphylococci* counts (ICMSF, 1982).
- Determination of total mould and yeast count (Cruickshank *et al.,* 1975).
- Isolation and identification of mould and yeast (Refai, 1987).
- Isolation and identification of *Staphylococcus aureus* (ICMSF, 1996).

2.5. Statistical analysis:

Data were analyzed by one way ANOVA. Means with different alphabetical superscripts in the same columns are significantly different at $P \leq 0.05$.

3. RESULTS:

From the results reported in table (1), it is obvious that 40%, 36.6% and 23.4% of the examined meat samples, 53.4%, 30% and 16.6% of the examined liver samples, 70%, 30% and zero% of the examined kidney samples and 43.4%, 26.6% and 30% of the examined lung samples took excellent, very good and good grades, respectively according to the quality system [1]. Regarding the results recorded in table (2), pH mean values 5.70 ± 0.04 in the examined meat samples, 6.45 ± 0.02 in the examined liver samples, 6.49 ± 0.01 in the examined kidneys samples and finally 6.48 ± 0.02 in the examined lung samples. It is evident from the results recorded in table (2) that TVN mean values (mg/100gm) 12.68 ± 0.02 in the examined meat samples, 13.06 ± 0.04 in the examined liver samples, 12.76 ± 0.03 in the examined kidney samples and finally 12.98 ± 0.04 in the examined lung samples. Results achieved in table (2) revealed that TBA mean values (mg malonaldehyde/ kg of sample) 0.24 ± 0.01 in the examined meat samples, 0.16 ± 0.01 in the examined liver samples, 0.25 ± 0.01 in the examined kidney samples and finally 0.24 ± 0.01 in the examined lung samples. Moreover, table (2) revealed that there were high significant differences in pH, TVN and TBA values ($p < 0.05$) between the examined samples of meat and edible offal. It is evident from the results recorded in table (3) that APC mean values (cfu/gm) in the examined samples $2.23 \times 10^5 \pm 48 \times 10^3$ for shoulder meat, $20.1 \times 10^4 \pm 37 \times 10^3$ for liver, $3.43 \times 10^5 \pm 1.97 \times 10^5$ for kidneys and $18.9 \times 10^4 \pm 3.8 \times 10^4$ for lungs. Table (3) indicated that the mean values of *Enterobacteriaceae* count (cfu/gm) in the examined samples $10.8 \times 10^4 \pm 2.6 \times 10^4$, $84 \times 103 \pm 18 \times 10^3$, $69 \times 10^3 \pm 17 \times 10^3$ and $84 \times 10^3 \pm 21 \times 10^3$ for shoulder meat, liver, kidneys and lungs respectively. From the obtained results recorded in table (3), it was clear that the mean values of coliform count (cfu/gm) in

the examined samples $44\times10^3 \pm 12\times10^3$ for shoulder meat, $34\times10^3 \pm 7\times10^3$ for liver, $22\times10^3 \pm 5\times10^3$ for kidneys and $32\times10^3 \pm 8\times10^3$ for lungs. The data recorded in table (3) revealed that the mean values of total *Staphylococci* count (cfu/gm) in the examined samples were $28\times10^3 \pm 5\times10^3$ for shoulder meat, $23\times10^3 \pm 4\times10^3$ for liver, $23\times10^3 \pm 5\times10^3$ for kidneys and $20\times10^3 \pm 4\times10^3$ for lungs. In other words, there were no significant differences in APC, *Enterobacteriaceae*, coliform and total *Staphylococci* counts ($P < 0.05$) between the examined samples of meat and edible offal. Table (4) declared that 40%, 20%, 13.3% and 30% of the examined meat, liver, kidney and lung samples, respectively, were contaminated with *S. aureus*. It is evident from table (3) that the mean values of total mould count (cfu/gm) of the examined samples $1.24\times10^2 \pm 0.64\times10^2$ for shoulder meat, $0.46\times10^2 \pm 0.09\times10^2$ for liver, $0.49\times10^2 \pm 0.1\times10^2$ for kidneys and $0.87\times10^2 \pm 0.22\times10^2$ for lungs. Means within examined samples of meat and edible offal showed no significant differences ($P < 0.05$). Identification of mould species isolated from the examined samples of meat and edible offal was shown in table (5). In shoulder meat were *Aspergillus spp.* 66.6%, *Penicillum spp.* 23.3%, *Geotrichum spp.* 43.3%, *Cladosporium spp.* 16.6%, *Fusarium spp.* 6.6%, *Alternaria spp.* 20% and *Mucor spp.* 36.6% but *Rhizopus spp.* failed to be detected, in liver were *Aspergillus spp.* 60%, *Penicillum spp.* 23.3%, *Geotrichum spp.* 13.3%, *Cladosporium spp.* 16.6%, *Fusarium spp.* 10%, *Alternaria spp.* 6.6%, *Rhizopus spp.* 10% and *Mucor spp.* 11%, in kidneys were *Aspergillus spp.* 56.6%, *Penicillum spp.* 13.3%, *Geotrichum spp.* 16.6%, *Fusarium spp.* 10%, *Alternaria spp.* 13.3%, *Rhizopus spp.* 6.6% and *Mucor spp.* 36.6%, but *Cladosporium spp.* failed to be detected and in lungs were *Aspergillus spp.* 63.3%, *Penicillum spp.* 20%, *Geotrichum spp.* 10%, *Cladosporium spp.* 23.3%, *Fusarium spp.* 20%, *Alternaria spp.* 16.6% and *Mucor spp.* 13.3% but *Rhizopus spp.* failed to be detected. It is evident from table (3) that the mean values of total yeast count (cfu/gm) of examined samples $2.59\times10^2 \pm 1.41\times10^2$ for shoulder meat, $0.85\times10^2 \pm 0.36\times10^2$ for liver, $0.23\times10^2 \pm 0.07\times10^2$ for kidneys and $1.62\times10^2 \pm 0.8\times10^2$ for lungs. Means within examined samples of meat and edible offal showed no significant differences ($P < 0.05$). Table (6) showed the incidence of species of yeast isolated from the examined samples of meat and edible offal. *Rhodotorulla* was detected in 50%, 56.6%, 33.3% and 53.3% of the examined meat, liver, kidney and lung samples, respectively. While, *Candida kiusci* was detected in 36.6%, 13.3%, 26.6% and 23.3% of the examined meat, liver, kidney and lung samples, respectively.

4. DISCUSSION:

Meat and edible offal have long been considered as highly desirable, nutritious and protein-rich food, but at the same time, unfortunately, they are also highly perishable because they provide the nutrients needed to support the growth of many types of microorganisms. Due to their unique biological and chemical nature, their quality attributes deteriorate from the time of slaughter until consumption (Kalalou *et al.,* 2004). Due to lipid oxidation and bacterial growth which are the main factors that determine food quality loss and shelf life reduction. Lipid oxidation leads to the degradation of lipids and proteins which, in turn, contribute to the reduction in nutritional quality as well as deterioration in flavor, color and texture of displayed meat (Aguirrezábal *et al.,* 2000). Bacterial contamination can precipitate major public health hazards and economic losses in terms of food poisoning and meat spoilage (Fernàndez – López *et al.,* 2005).

From the results reported in table (1), it is obvious that according to the quality system recommended by Devatkl *et al.* (2004). Accordingly, all the examined samples were accepted organoleptically. It could be concluded that the examined kidney

Table (1): Organoleptic evaluation of examined cattle meat and offal samples at abattoir level (n= 30)

Samples		Meat		Liver		Kidneys		Lungs	
Quality	Point	No.	%	No.	%	No.	%	No.	%
Excellent	10	12	40	16	53.4	21	70	13	43.4
Very good	9	11	36.6	9	30	9	30	8	26.6
Good	8	7	23.4	5	16.6	---	---	9	30

Table (2): Statistical analyses of chemical results of examined samples of cattle meat and edible offal at abattoir level (n=30)

Parameters	Meat	Liver	Kidneys	Lungs
PH	5.70 ± 0.04b	6.45 ± 0.02a	6.49 ± 0.01a	6.48 ± 0.02a
TVN	12.68 ± 0.02b	13.06 ± 0.04a	12.76 ± 0.03b	12.98 ± 0.04a
TBA	0.24 ± 0.01a	0.16 ± 0.01b	0.25 ± 0.01a	0.24 ± 0.01a

There were high significant differences ($P < 0.05$) in pH, TVN and TBA values of the examined samples.

Table (3): Statistical analyses of microbiological results of examined samples of cattle meat and edible offal at abattoir level (n=30)

Count CFU/g	Meat	Liver	Kidney	Lung
APC	2.36×105±48×103a	20.1×104±37×103a	3.43×105±1.97×105a	18.9×104±3.8×104a
EC	10.8×104±2.6×104a	84×103±18×103a	69×103±17×103a	84×103±21×103a
CC	44×103±12×103 a	34×103±7x103 a	22x103±5x103 a	32x103±8x103 a
TSC	28×103±5×103 a	23x103±4x103 a	23x103±5x103 a	20x103±4x103 a
TMC	1.24×102±0.64×102 a	0.46×102±0.09×102 a	0.49×102±0.1×102 a	0.87×102±0.22×102 a
TYC	2.59×102±1.41×102a	0.85×102±0.36×102a	0.23×102±0.07×102a	1.62×102±0.8×102a

There were no significant differences ($P < 0.05$) in APC, TEC, TCC, TSC, TMC and TYC of the examined samples.

-APC: Aerobic Plate Count. -EC: *Enterobactriaceae* Count.

-CC: Coliform Count. - TSC: Total Staphyiococcal Count

-TMC: Total Mould Count. - TYC: Total Yeast Count

Table (4): Incidence of Staphylococcus aureus isolated from the examined samples of cattle meat and edible offal at abattoir level (n=30)

Samples	No.	%
Meat	12	40
Liver	6	20
Kidney	4	13.3
Lung	9	30

Table (5): Incidence of mould species isolated from the examined samples of cattle meat and edible offal at abattoir level (n = 30)

Samples / Mould spp.	Meat		Liver		Kidneys		Lungs	
	No.	%	No.	%	No.	%	No.	%
Aspergillus spp.	20	66.6	18	60	17	56.6	19	63.3
Penicillum spp.	7	23.3	7	23.3	4	13.3	6	20
Geotrichum spp.	13	43.3	4.	13.3	5	16.6	3	10
Cladosporium spp.	5	16.6	5	16.6	---	---	7	23.3
Fusarium spp.	2	6.6	3	10	3	10	6	20
Alternaria spp.	6	20	2	6.6	4	13.3	5	16.6
Rhizopus spp.	---	---	3	10	2	6.6	---	---
Mucour spp.	11	36.6	5	16.6	11	36.6	4	13.3

Table (6): Incidence of yeast species isolated from the examined samples of cattle meat and edible offal at abattoir level (n = 30)

Samples	Meat		Liver		Kidneys		Lungs	
Mould spp.	No.	%	No.	%	No.	%	No.	%
Rhodotorulla	15	50	17	56.6	10	33.3	16	53.3
Candida kiusci	11	36.6	4	13.3	8	26.6	7	23.3

samples showed superior organoleptic quality than the examined lung samples. Such findings may be attributed to the fact that kidneys are embedded in body fat and remain hanged in the body cavity not handled except by the veterinarian's knife. However, lungs undergo numerous faulty manipulations and handling from butchers.

Regarding the results recorded in table (2), pH mean values in the examined samples and according to the safe permissible limit stipulated by EOS (2005) for pH in red meat (5.6 - 6.2) and edible offal (6 - 6.8), it was indicated that all the examined samples of meat and edible offal were in accordance with this limit. The obtained results were nearly similar to those reported by Immonen *et al.* (2000). While, higher results were obtained by El-Shamy (2011) in the examined liver samples (6.96 ± 0.09). However, lower results were reported El-Shamy (2011) in the examined lung samples (6.08 ± 0.07). pH value plays an important role for the microbiological growth quality affecting the shelf life of meat (Hathout-Amal and Aly-Soher, 2010).

It is evident from the results recorded in table (2) that TVN mean values showed that all the examined samples of meat and edible offal were accepted according to the safe permissible limit recommended by EOS (2005) for TVN in red meat (should not exceed 20 mg/100 gm) and edible offal (should not exceed 30 mg/100 gm). TVN value was more useful for assessing the degree of meat deterioration than for evaluating the changes occurring during the first storage stages (El Marrakchi *et al.,* 1990).

Results achieved in table (2) revealed that TBA mean values (mg malonaldehyde/kg of sample) in the examined meat and edible offal were accepted based on their TBA content according to EOS (2005) which stated that the maximum permissible limit for TBA in meat and edible offal should not exceed 0.9 mg malonaldehyde/kg of sample. TBA is a good indicator of the quality of meat. TBA value is a widely used indicator for the assessment of degree of lipid oxidation (Raharjo and Sofos, 1993).

It is evident from the results recorded in table (3) that the mean values of APC (cfu/gm) in the examined samples of meat and edible offal and according to the safe permissible limit stipulated by EOS (2005) for APC in red meat (not exceed 10^6 cfu/gm) and edible offal (not exceed 10^5 cfu/gm), it was indicated that all the examined samples of red meat were in accordance with this limit. While, all the examined samples of edible offal were not in accordance with this limit. Concerning red meat cuts, nearly similar results were obtained by Feizullah and Daskalov (2010). However, lower results were obtained by Shimaa (2012). While, higher results were obtained by Hejazi (2013). Regarding to edible offal, lower results were obtained by Ammar (2012), but higher results were obtained by Rasha (2013). Aerobic plate count is generally accepted as a criterion for microbial contamination of carcasses and a useful indicator of hygienic conditions of abattoir (Cohen *et al.,* 2007).

Table (3) indicated that the mean values of total *Enterobacteriaceae* count (cfu/gm) in the examined samples of meat and edible offal were unaccepted based on their *Enterobacteriaceae* count according to EC (2007) which stated that the maximum permissible limit for *Enterobacteriaceae* count in meat and edible offal should not exceed 3.17×10^2 cfu/gm. Regarding to red meat, nearly similar results were obtained by Hejazi (2013). However, higher results were obtained by Ali (1992) and lower results were obtained by Feizullah and Daskalov (2010), Sabik (2011), and Shimaa (2012). Concerning edible offal, higher results were obtained by El-Shamy (2011). While, lower results were obtained by Ammar (2012).

Enterobacteriaceae have an epidemiological importance as some of their members are pathogenic and may cause serious infections and food poisoning outbreaks to human being. The presence of *Enterobacteriaceae* in large numbers in food indicates improper hygienic measures, inadequate processing or recontamination due to cross contamination by raw materials, dirty equipment or unhygienic handling (Gill and Landers, 2004).

From the obtained results recorded in table (3), it was clear that the mean values of coliform count (cfu/gm) in the examined meat and edible offal and according to the safe permissible limit stipulated by FAM [33] for total coliform count in red meat (not exceed 10^3 cfu/gm) and edible offal (not exceed 10^2 cfu/gm), it was indicated that all the examined samples of red meat and edible offal were unaccepted with this limit. The current results of red meat were nearly similar with those obtained by Hejazi (2013). While, higher results were obtained by Yadav *et al.* (2006) and lower results were obtained by Sabik (2011) and Shimaa (2012) 4.36×10^2 (cfu/gm). On the other hand, nearly similar results of edible offal were obtained by Ammar (2012). While, higher results were obtained by El-Shamy (2011). Furthermore, the high coliform count of edible offal may be attributed to the unsanitary conditions of offal collection after evisceration; putting offal on floor contaminated with fecal matters and delayed transportation of offal to special hygienic place. Total coliform count is used as general indicator of water pollution or sanitary conditions in the food processing environment (Feng *et al.,* 2002).

The data recorded in table (3) revealed that the mean values of total *Staphylococci* count (cfu/gm) in the examined samples of meat and edible offal nearly similar with results in red meat which obtained by Sabik (2011). However, lower results were

obtained by El-Shamy (2008). Higher results were obtained by Hejazi (2013). While, nearly similar results in edible offal were obtained by El-Shamy (2011). Meanwhile, lower results were obtained by Ammar (2012). Higher results were obtained by Rasha (2013). *Staphylococci* are commonly found in the skin and upper respiratory tract of man and animals and can easily contaminate the carcass. The presence of *Staphylococci* on carcass surface may be due to contamination during dressing and evisceration in slaughter house, contaminated equipment, butcher's hand with abrasions and wounds, slaughter of animal beside dressed one in the same area in the slaughter hall and contamination of air from crowdness of workers and their aerosols (Lasts *et al.,* 1992). The obtained results of red meat were nearly similar with those reported El-Shamy (2011). While, lower results were obtained by Sabik (2011) who mentioned the ratio was 4%. Concerning edible offal, lower results were obtained by Rasha (2013) who found coagulase positive *S. aureus* in 4% and 4% of the examined samples of beef liver and kidney, respectively.. Higher results were obtained by Ammar (2012) who found coagulase positive *S. aureus* in 42% and 28 % of the examined samples of beef liver and kidney, respectively.

Staphylococcus aureus enterotoxins are the predominant cause of gastrointestinal symptoms observed during intoxications. *Staphylococcus aureus* is considered the third most important cause of disease in the world amongst the reported food-borne illnesses (Tamarapu *et al.,* 2001).

It is evident from table (3) that the mean values of total mould count (cfu/gm) of the examined samples of meat and edible offal showed that all the examined samples of meat and edible offal were rejected based on their total mould count according to EOS (2005) which stated that meat and edible offal should be free from any fungal growth. Nearly similar results in red meat were obtained by Hejazi (2013). While, nearly similar results in edible offal were obtained by El-Shamy (2011). Higher results were obtained by Rasha (2013) who mentioned that the average mould counts were 2.97×10^5 , 1.04×10^6 and 1.55×10^5 (cfu/gm) in the examined liver, kidney and lung samples, respectively.

Presence of mould in the examined samples may be attributed to the fact that mould need moisture to grow. So, they often found in environment as abattoir in which water is the base of the work (EL-Shamy, 2011). Mould count is used as an index of proper sanitation and high quality products. Mould can grow over an extremely wide range of temperature. They can assist in the putrefactive processes and may produce toxic substances namely mycotoxins which may lead to hemorrhages with hepatotoxic, carcinogenic or immunosuppressive effects (Hassan *et al.,* 2004). Identification of mould species isolated from the examined samples of meat and edible offal was shown in table [5]. These results when compared with another results obtained by El-Shamy (2011) and Rasha (2013) we found numerous variations in the rate of incidence and distribution of mould species on the examined samples. Some were agreed, some were lower and some were higher.

It is evident from table (3) that the mean values of total yeast count (cfu/gm) of examined samples of meat and edible offal showed no significant differences ($P < 0.05$). Nearly similar results were obtained by El-Shamy (2011). Yeasts normally play a small role in spoilage because they constitute only a small portion of the initial population. They grow slowly in comparison with most bacteria and their growth may be limited by metabolic substances produced by bacteria. Spoilage yeasts find their way into food resulting in undesirable changes in physical appearance of food. Some species of yeast constitute a public health hazard as some species of *Candida* may cause gastrointestinal disturbances, vulvovaginitis, endocarditis, pulmonary infection, and occasionally fatal systemic disease (Jesenska and Hardinovva, 1981).

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جودة لحوم الأبقار وأحشائها على مستوي المجازر

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الملخص العربي

اجريت هذه الدراســـه بمجازر محافظة البحيره على ذبائح الابقار حيث تم اخذ 120 قطعة عينه من اللحم والاحشـــاء وذلك بمعدل 30 عينه من لحم الكتف و30 عينه من الكبد و30 عينه من الكلى و30 عينه من الرئتين لمعرفة التغيرات الحسيه مثل اللون والرائحه والقوام وكانت كلها طبيعيه وذات جوده عاليه. كما تم عمل بعض الاختبارات الكيميائيه مثل قيمة الايدروجين فى عينات اللحوم هو7.5 والكبد 6.45 والكلى 6.49 والرئتين 6.48. ثانيا نســبة المركبات النيتروجين الطياره وكان نســبة متوســـط نتـائجهـا (مجم/100جم) فى عينـات اللحوم والكبـد والكلى والرئتين على الترتيـب هو12.68 ، 13.06 ، 12.76 ،12.98. ثالثا نســبة حامض الثيوباربيتيورك (مجم مالونالدهيد/كجم عينه) وكان نســبة متوســط نتائجها فى عينات اللحوم والكبد والكلى والرئتين على الترتيب هو 0.24 ، 0.16 ، 0.25 ،0.24 تم عمل الاختبارات الميكروبيه للحوم والاحشاء مثل العد الكلى للبكتيريا الهوائيه وكان متوســـط العدد الكلى للبكتيريا الهوائيه فى عينات اللحوم و الكبد والكلى والرئتين على الترتيب هو 2.36×10^5 ، 20.1×10^4 ، 3.43×10^5 ، 18.9×104 لكل جم والعد الكلى للبكتيريا المعويه وكان متوسط العدد الكلى للبكتيريا المعويه فى عينات اللحوم والكبد والكلى والرئتين على الترتيب هو 10.8×10^4 ، 84×10^3 ، 69×10^3 ، 84×10^3 لكل جم والعد الكلى للبكتيريا القولونيه وكان متوســـط العد الكلى للبكتيريا القولونيه فى عينات اللحم والكبد والكلى والرئتين على الترتيب هو 44×10^3 ، 34×10^3 ، 22×10^3 ، 32×10^3 لكل جم والعد الكلى للبكتيريا العنقوديه وكان متوســـط العدد الكلى للبكتيريا العنقوديه فى عينات اللحم مالكبد والكلى والرئتين على الترتيب هو 28×10^3، 23×10^3 ، 23×10^3 ، 20×10^3 لكل جم. وقد تم عزل بكتيريا العنقود الذهبى من عينات اللحم والكبد والكلى والرئتين بنسب 40% ، 20% ، 13% ، 30% على التوالى. العد الكلى للخميره الفطريه وكان متوسط العدد الكلى للخميره فى عينات اللحم والكبد والكلى والرئتين على الترتيب هو 2.59×10^2 ، 0.85×10^2 ، 0.23×10^2 ، 1.62×10^2 لكل جم. وقد تم عزل خميرة رودوتوريولا من عينات اللحم و الكبد والكلى والرئتين بنسـب 50% ، 57% ، 33% ، 53% على التوالى وايضـا تم عزل خميرة كانديدا كويسـكى من عينات اللحم والكبد والكلى والرئتين بنيب 37% ، 13% ، 27% ، 23% على التوالى. العد الكلى لفطريـات العفن وكـان متوســـط العدد الكلى للعفن فى عينـات اللحم والكبد والكلى والرئتين على الترتيب هو 1.24×10^2 ، 0.46×10^2 ، 0.49×10^2 ، 0.87×10^2 لكل جم. وقد تم عزل انواع من العفن ففى عينات اللحم وجد انم نسبة الاسبيرجيلس ، البنسيليوم ، الجيوتريكم ، الكلادوسبوريم ، الفيوزاريم ، الالتيرناريا ، الميوكر هى 66.6% ، 23.3% ، 43.3% ، 16.6% ، 6.6% ، 20% ، 36.6 على التوالى ولا وجود للريزوبس. وفى عينات الكبد وجد ان نسبة الاسبيرجيلس ، البنسيليوم ، الجيوتريكم ، الكلادوسبوريم ، الفيوزاريم ، الالتيرناريا ، الريزوبس ، الميوكر هى 60% ، 23.3% ، 13.3% ، 16.6% ، 10% ، 6.6% ، 10% ، 16.6% على التوالى. بينما كانت فى الكلى نســبة الاســبيرجيلس ، البنســيليوم ، الجيوتريكم ، الفيوزاريم ، الالتيرناريا ، الريزوبس ، الميوكر هى 56.6% ، 13.3% ، 16.6% ، 10% ، 13.3% ، 6.6% ، 36.6% على التوالى. اما فى عينات الرئتين كانت نسبة الاسبيرجيلس ، البنسـيليوم ، الجيوتريكم ، الكلادوسـبوريم ، الفيوزاريم ، الالتيرناريا ، الميوكر هى 63.3% ، 20% ، 10% ، 23.3% ، 20% ، 16.6% ، 13.3% على التوالى ولا وجود للريزوبس. وقد خلصـــت هذة الدراســـه الى خطورة تلوث اللحوم والاحشاء بالجراثيم المختلفه والتى لها تاثير ضار على الصحه العامه.

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