MYCOLOGICAL EVALUATION OF RABBIT CARCASSES

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A B S T R A C T

This study was conducted to evaluate mycological contamination of rabbit carcasses, and its hazard on public health. A total of 100 swab samples were collected from the surfaces of fore and hind quarters of fresh and frozen rabbit carcasses (25 of each) from different abattoirs for mycological examination. Mold count of the examined samples of fresh fore and hind quarters ranged from 1.0×10^2 to 1.5×10^3 and 1.0×10^2 to 2.6×10^3 with mean values of $5.80\times10^2\pm1.06\times10^2$ cfu/cm^{2}and $6.50\times10^2\pm1.29\times10^2$ (cfu/cm^2), respectively. Also, those frozen fore and hind quarters ranged from 1.0×10^2 to 2.0×10^2 and 1.20×10^2 to 4.0×10^2 with mean values of $1.20\times10^2\pm0.17\times10^2$(cfu/cm^2) and $1.60\times10^2\pm 0.48\times10^2$ (cfu/cm^2),respectively. The isolated mold species from rabbit carcasses were *Aspergillus, Mucor, Penicillium, Alternaria, Fusarium, Geotrichum and Scopuloriapsis* spp. . *Aspergillus* strains were *A.flavus, A.fumigatus, A.niger*. Moreover, the mean values of aflatoxins (ug/L) extracted from the toxigenic strains of *A. flavus* were 41.04± 1.65 (ug/L)for B_1, 29.87± 1.26 (ug/L)for B_2 , 15.41 ±0.90 (ug/L)for G_1 & G2 9.38 ±0.49(ug/L) in fresh fore quarters, and B1 76.85± 3.28(ug/L), B2 57.14± 2.39(ug/L),G1 40.53 ±2.12(ug/L) , G2 19.66 ±1.25(ug/L) in frozen hind quarter, respectively . Concerning to the mean values of the total yeast count/cm^2 in the examined swab samples of fresh and frozen fore and hind quarters ranged from $3.57\times10^3\pm 0.84\times10^3$ (cfu/cm^2),$1.81\times10^3\pm0.25\times 10^3$ (cfu/cm^2) ,$4.33\times10^2\pm 0.62\times10^2$ (cfu/cm^2) and $3.86\times10^2\pm0.58\times10^2$ (cfu/cm^2), respectively. *Candida, Rhodotorula, Sacchromyces* and *Torulopsis* were detected. The present study concluded that rabbit carcasses and can contribute to mycological risk and contamination .

Keywords : Fungi, mold, yeast ,rabbit, mycotoxin, aflatoxin .

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1. INTRODUCTION

Due to the high need of the world to animal protein which is considered the most important element than other food elements at all, because it contributes in all building processes which are responsible for repairing of the damaged body tissues. So, the world as a whole begins to search for new resources as protein. That's why, rabbits seem as an important source for protein which characterized by high protein and water ratio with a low fat ratio. So, it facilitates the digestibility and increases the nutritive value of this rabbit protein. Rabbit meat is a highly desirable food which represents a good source of animal protein of a high biological value . It contains all essential amino acids required for human nutrition as well as a higher proportion of unsaturated fatty acids and less cholesterol than other kinds of animal meat [Gergis, 2004].

Mould and yeast comprise a large group of microorganisms which are ubiquitous in nature and affect our food supply as a result of their contamination. They are responsible for a major protein of food deterioration in developing countries . Their presence in meat and meat products are regarded as an

indicator of the hygienic conditions under which these products are produced and stored lead finally to either spoilage or food borne mycotoxicosis. A long with molds, yeasts belong to the class mycota or fungi, which are primitive plant like structure taking in chlorophyll . The yeasts are microscopic, single-celled organisms generally larger than the bacteria . Yeasts are mostly saprophytic, while few species are pathogenic. They occur almost everywhere in the environment as well as skin and in alimentary tract of mammals . A mold consists of a mycelium of branched filaments (hyphae) which bear spores of conidia . In contrast to the yeasts, molds can be seen with the naked eye as fluffy growths on food; colored black, white, or other pigments . Like yeasts, they are primarily saprophytic organisms, breaking down complex organic materials into simpler substances , Thus contributing to the decomposition of meat [Gracy, 1992].

Mycotoxins are secondary metabolites produced by microfungi that are capable of causing disease and death in humans and other animals . Mycotoxins may enter the food supply by direct contamination resulting from mold growth on food or by indirect contamination through the use of contaminated ingredients in processed food industry . Mycotoxins, are highly toxic, carcinogenic, mutagenic and constitute apotential health hazard to human being [Youssef, 1986& Bullerman, 1979]. Therefore, the present study was performed to isolate and identify the mold and yeast contamination as well as to detect the toxic substances produced by *Aspergillus flavus* (Aflatoxins) isolated from rabbit carcasses .

2. MATERIALS AND METHODS

2.1. Collection of samples:

A total of 100 random swab samples were taken from the surfaces of fresh and frozen 50 rabbit carcasses (25 of each) as well as 50 swab samples from fore and hind quarter (25 of each) from different abattoirs in Qaliubiya governorate. All collected swab samples were transferred to laboratory under a complete aseptic condition without undue delay for mycological examination.

2.2. Mycological examination:

Swabs were represented by cotton screw cabbed plastic tubes (CITOSWAB ®) which are ready for use.

2.2.1. Preparation of template Walter,[1967] :

A template made of metal having an exposed inner area of 10 cm^2 (2×5) was used to outline the area of sampling. The templates were wrapped in aluminum foil and sterilized in a hot air oven at 180^0C for 20 minutes.

2.2.2. Preparation of swab samples:

A limited area 10 cm^2 (from surface of examined rabbit carcasses) were swabbed using the swab method recommended by [Kiss, 1984]. The collected swabs were mixed in 90 ml of sterile buffered pepton water to give 10^{-1} dilution. Ten fold serial dilution were prepared [APHA, 1992] .

3.2.3. Determination of total mold and yeast count : According to [A.P.H.A., 1966].

3.2.4. Isolation and identification of mold:

According to Raper and Fennel (1965) , Barnette and Hunter (1978), ARX (1977), Samson et al. (1981) .

3.2.5. Isolation and identification of yeast :

According to Barnette et al., (1983) and Lodder and Kreger Van RIG (1976) and Lechner (1992).

3.3.Toxigenicity test for Aspergillus flavus strains : According to Davis et al. (1966).

3.4. Qualitative and quantitative estimation of aflatoxins: According to Schuller et al. (1983).

3.5. Statistical analysis: According to Feldman, (2003).

3. RESULTS

Table (1) showed that statistical analytical results of total mold count/cm^2 in the examined swab samples of fresh fore and hind quarters were ranged from 1.0×10^2 to 1.5×10^3 and 1.0×10^2 to 2.6×10^3 with mean value $5.80\times10^2\pm 1.06\times10^2$ (cfu/cm^2) and $6.50\times 10^2\pm1.29\times10^2$ (cfu/cm^2),respectively. Also frozen fore and hind quarters were ranged from 1.0×10^2 to 2.0×10^2 and 1.20×10^2 to 4.0×10^2 with mean value $1.20\times10^2\pm 0.17\times10^2$ (cfu/cm^2) and $1.60\times 10^2\pm0.48\times10^2$ (cfu/cm^2),respectively. Results achieved in table (2) reported the incidence of molds contaminated the examined samples of rabbit swab of fresh fore and hind quarters were (5) 20 % ; (8) 32 % and frozen fore and hind quarter were (4) 16 % ; (5) 20 % , respectively. Also, it was detected that result in table (3) showed that Incidence of mold species isolated from examined surfaces of rabbit carcasses samples of fresh and frozen samples (in fore and hind quarter) ,respectively were *Alternaria* 0%, 0%, 0%, 4% and *Aspergillus* 52%, 40%, 5%, 32% and *Fusarium* 0%, 0%, 1%, 4% and *Geotrichum* 0%, 0%, 0%, 4% and *Mucor* 4%, 4%, 1%, 0% and *Penicillium* 4%, 4%, 1%, 8% and *Scopuloriapsis* 8%, 0%, 2%, 0% .It is evident from the results recorded in table (4) that the incidence of *A.flavus* isolated from examined surfaces of rabbit carcasses samples of fresh and frozen samples (in fore and hind quarter) , respectively were *A.flavus* 40%, 4%, 4%, 8% and *A.fumigatus* 4%, 32%, 12%, 20% and A.niger 8%,4%, 4%, 4% . Table (5) showed that toxigenicity of *A.flavus* isolated from examined surfaces of rabbit carcasses samples of fresh and frozen samples (in fore and hind quarter), respectively were the Toxigenic 24%, 0%, 0%, 8% and the non toxigenic 16%, 4%, 4%, 0% . Moreover, results achieved in table (6) recorded that the mean value of aflatoxins (ug/L) extracted from the toxigenic strains of *A. flavus* isolated from the examined samples of fresh fore quarter and frozen hind quarter rabbit meat were B141.04± 1.65(ug/L) ,B2 29.87± 1.26(ug/L), G115.41 ±0.90(ug/L) ,G2 9.38 ±0.49(ug/L), and B1 76.85± 3.28(ug/L), B2 57.14± 2.39(ug/L) ,G1 40.53 ±2.12(ug/L), G2 19.66 ±1.25(ug/L) , respectively .

Table (7) showed that the incidence of yeasts contaminated the examine samples of rabbit swab of fresh fore quarter and fresh hind quarter were 9 (36%) and 13 (52%) respectively, and in frozen fore quarter and frozen hind quarter were 5 (20%) and 7 (28%) , respectively . As explained in table (8) the statistical analytical results of total yeast count/cm^2 in the examined samples of fresh fore and hind quarters were ranged from 2.0×10^2 to 1.0×10^4 and 2.0×10^2 to 9.3×10^3 .Also frozen fore and hind quarters were ranged from 1.0×10^2 to 7.0×10^2 and 1.0×10^2 to 1.3×10^3 , respectively. It was detected that result in table (9) that the incidence of yeast species isolated from examined surfaces of rabbit carcasses samples of fresh and frozen samples (in fore and hind quarter), respectively were *Candida* 32%, 44%, 16%, 24% and *Rhodotorula* 8%, 20%, 0%, 4% and *Sacchromyces* 16%, 32%, 20%, 28% and *Torulopsis* 28%, 48%, 4%, 12% .

4. DISCUSSION

It was demonstrated in table (1,2) that mold contamination in fresh rabbit carcasses higher than frozen carcasses. Also, in fresh rabbit carcasses the significant differences was (P<0.05). The previous results agreed with (Mostafa, 2001) who studied the total mold count for frozen quails and fresh quails and found

Table (1): Statistical analytical results of total mold count/cm^2 in the examined surfaces of rabbit carases samples (n=25).

Site / Status	Fore quarter			Hind quarter		
	Min	Max	Mean ± S.E*	Min	Max	Mean ± S.E*
Fresh meat +	1.0×10^2	1.5×10^3	$5.80\times10^2\pm 1.06\times10^2$	1.0×10^2	2.6×10^3	$6.50\times10^2\pm 1.29\times10^2$
Frozen meat	1.0×10^2	2.0×10^2	$1.20\times10^2\pm 0.17\times10^2$	1.0×10^2	4.0×10^2	$1.60\times10^2\pm 0.48\times10^2$

S.E* = standard error of mean
+ = Significant differences (P<0.05)

Table (2): Incidence of mold isolated from examined surfaces of rabbit carcasses samples (n=25)

Site / Status	Fore quarter		Hind quarter	
	No	%	No	%
Fresh meat	5	20	8	32
Frozen meat	4	16	5	20
Total (50)	9	18	13	26

Table (3): Incidence of mold species isolated from examined surfaces of rabbit carcasses samples (n=25)

	fresh				frozen			
	fore		hind		fore		hind	
	No.	%	No.	%	No.	%	No.	%
Alternaria	-	-	-	-	-	-	1	4
Aspergillus	13	52	10	40	20	5	8	32
Fusarium	-	-	-	-	4	1	1	4
Geotrichum	-	-	-	-	-	-	1	4
Mucor	1	4	1	4	4	1	-	-
Penicillium	1	4	1	4	4	1	2	8
Scopuloriapsis	2	8	-	-	8	2	-	-

Table (4): Incidence of *Aspergillus* species isolated from examined surfaces of rabbit carcasses samples (n=25)

	fresh				frozen			
	fore		hind		fore		hind	
	No.	%	No.	%	No.	%	No.	%
A.flavus	10	40	1	4	1	4	2	8
A.fumigatus	1	4	8	32	3	12	5	20
A.niger	2	8	1	4	1	4	1	4

Table (5): Toxigenicity of *A.flavus* isolated from examined surfaces of rabbit carcasses samples (n=25)

	fresh				frozen			
	fore		hind		fore		hind	
	No.	%	No.	%	No.	%	No.	%
Toxigenic	6	24	-	-	-	-	2	8
Non toxigenic	4	16	1	4	1	4	-	-

Table (6): Mean values of aflatoxins (ug/L) extracted from the toxigenic strains of *A. flavus* isolated from the examined swab samples of rabbit carcases

Aflatoxin Site & Status	B1	B1	G1	G2
Fresh fore quarter meat++	41.04 ± 1.65	29.87 ± 1.26	15.41 ± 0.90	9.38 ± 0.49
Frozen hind quarter meat	76.85 ± 3.28	57.14 ± 2.39	40.53 ± 2.12	19.66 ± 1.25

S.E* = Standard error of mean
++ = High significant differences (P<0.01)

Table (7): Incidence of yeasts contaminated the examined swab samples of carcases(n=25).

Site / Status	Fore quarter		Hind quarter	
	No	%	No	%
Fresh meat	9	36	13	52
Frozen meat	5	20	7	28
Total (50)	14	28	20	40

Table (8): Statistical analytical results of total yeast count/cm^2 in the examined swab samples of rabbit carcases (n=25).

Site	Fore quarter			Hind quarter$^+$		
Status	Min	Max	Mean ± S.E*	Min	Max	Mean ± S.E*
Fresh meat^{++}	2.0×10^2	1.0×10^4	$3.57\times10^3\pm 0.84\times10^3$	2.0×10^2	9.3×10^3	$1.81\times10^3\pm 0.25\times10^3$
Frozen meat	1.0×10^2	7.0×10^2	$4.33\times10^2\pm 0.62\times10^2$	1.0×10^2	1.3×10^3	$3.86\times10^2\pm 0.58\times10^2$

S.E* = standard error of mean
+ = Significant differences (P<0.05)
++ = High significant differences (P<0.01)

Table (9): Incidence of yeast species isolated from examined surfaces of rabbit carcasses samples (n=25)

	fresh				frozen			
	fore		hind		fore		hind	
	No.	%	No.	%	No.	%	No.	%
Candida	8	32	11	44	4	16	6	24
Rhodotorula	2	8	5	20	-	-	1	4
Sacchromyces	4	16	8	32	5	20	7	28
Torulopsis	7	28	12	48	1	4	3	12

that the mean values for the total mold were $5.7x10^4$ and $6x10^4$, respectively. And this was referred to that fungi are of ubiquitous in nature where they are introduced into animal tissues at the time of slaughtering and throughout processing of meat (Davis, et al 1980), (Mansour, et al 1990) indicated that the majority of meat spoilage by mold strains survived freezing storage of meat and produced their special effect at the favorable temperature and humidity. Contamination of meat with molds originated generally from slaughter halls and other

environment . (Gracy & Collins, 1992) mentioned that mold formation is not common in cold stored rabbit carcasses, but it appears as a white spots on the surfaces which were frozen then defrosted then refrozen, this is due to error in refrigeration on board ships. So, slight moldiness is removed by wiping while the severely affected rabbit carcasses should be totally condemned. Also, they found that the growth of molds can be prevented by proper ventilation in refrigerating and storage works. So that, circulating air may dry the surface of meat and their containers. They explained that intermittent freezing or temperature fluctuations in a refrigerating chamber are common predisposing causes to mold growth. Mold growths on imported meat are not usually associated with decomposition because some molds can develop between -2.5^{o}C and -8^{o}C, at the same time putrefactive organisms only grow at temperature above freezing.

Also,(Abraham, et al 1993) found that low moisture could reduce the mold count. But different results obtained by (Tamer,2008) who stated that, the total mold counts in fresh and frozen rabbit samples by swab method ranged from 10 to 70 and 10 to 60 with a mean value of 35.8± 2.6 (cfu/cm^2), respectively. While the total yeast counts in fresh and frozen samples by swab method ranged from 20 to 50 and 30 to 70 with a mean value of 37.5± 5.44 and 50± 14.14 (cfu/cm^2), respectively .

Results achieved in table (3) illusterated that the mold species found in the surface of rabitt carcases were *Aspergillus* which was the highest in fresh swab samples whereas, *Penicillium* was the high in frozen samples and *Mucor*, *Fusarium, Alternaria, Scopuloriapsis* and *Geotrichum* were detected . The previous results partially agreed with (Hechelman, 1981) who recorded that the most important mold genera isolated from meat were *Aspergillus, Penicillium, Cladosporium, Alternaria, Fusarium, Mucor* and *Rhizopus* in descending percentages. Although most molds grow best around 70 degrees Fahrenheit, different types of mold require certain temperatures to grow. For example, the mold type *Penicillium* grows best at 34 degrees Fahrenheit, which is the typical temperature inside of a refrigerator. In contrast, *Aspergillus* is mold that prefers warmer temperatures of 98 degrees Fahrenheit, which is the normal temperature inside the human body. It was detected in table (4) *Aspergillus* species isolated from examined surfaces of rabbit carcasses were *A.flavus* which was identified in high percentage in fresh samples where *A. niger* and *A. fumigatus* were high in fresh and frozen swab samples. (Dragoni, et al 1980) investigated molds in 40 swab samples taken from the surface of Parma and San Daniele raw ripened hams, and could isolate *Aspergillus* (*A. candidus*; *A. flavus*; *A. fumigates; A. repens; A. caespitosus; A. niger; A. sulfurous; and A. wentii*); *Penicillium; Rhizopus*; and *Trichoderma* species. Also, he found that 90% of isolated *Aspergilli* were toxigenic. (Hesham, 2004)&(Rodriguez-Calleja, 2004) isolated molds from rabbit carcasses *Aspergillus* spp. , Mucor spp. , *Penicillium* were the most common species isolated from foods and were often toxic. But, they were in a difference with those obtained by (Abdel-Rahman, 1985)who examined 50 samples of frozen poultry meat with total mold count 83 and with percentage 6.6%. Mold genera which could be isolated were *Penicillium, Caldosporium, Aspergillus, Mucor, Geotrichum, Thamnidium, Rhizopus, Paecilomyces, Scopulariopsis* and *Botrytis* .

Table (5) showed that toxigenic strains of *A. flavus* found in highly incidence in fresh swab samples than in frozen ones . Also, Results detected in table (6) found that B1 and G1 contamination were highler than B2 and G2 in fresh fore and frozen hind quarters swab samples.Also, in fresh fore quarter there was high significant differences (P<0.01). The previous results were agreed with (El-Shawaf, 1990) who

reported that the two *A.flavus* cultures isolated from the sausage samples gave the four types of aflatoxins with average amount of B1 (50.5 µg/litre); B2 (33.5 µg/lit.); G1 (31.5 µg/lit.); and G2 (22.26 µg/lit.) in liquid medium. (Shaltout , 1992)who mentioned that the isolated *Aspergillus flavus* from fresh, frozen meat and meat and bone meal could produced B_1, B_2, G_1 and G_2 in Yeast Extract Sucrose medium (YES) .But, they were in a difference with those obtained by (Abdel-Rahman ,1987) who investigated molds in 50 samples of some untreated species commonly used for seasoning of meat products (10 from each of cumin; black pepper; white pepper; red pepper; and capsicum), and found that the average of total mold count per gram ranged from 2×102 to 3.4×106. The isolated 184 *A. flavus* strains were tested for aflatoxigenicity and revealed that 90 (48.9%) of them were aflatoxin producers; 100% of the toxic strains produced aflatoxin B1; 11.1% produced B2; and none produced G1 or G2. Moreover, (Ramadan, 1991) reported that out of 50 samples of frozen meat only 5 samples were contaminated with aflatoxin B_1 in amount ranged from 0.256 to 0.350 ug/kg.(Pitt, 1984)reported that the total viable counts of molds are not a reliable indicator of mycotoxin production.

Table (7, 8) showed that yeast contamination in fresh rabbitt swab samples was higher in fresh samples than in frozen ones. Also, in fresh rabbit carcasses high significant differences (P<0.01). Lower result obtained by (Nassar and Ismail ,1994)they examined mycologically imported frozen meat samples, they found that the mean value of yeast count in meat tissue less than 10^2 where, higher result obtained by (El-Shora, 1990) who found that the total mold count of stored poultry was $15x10^2$ and $16x10^2$/gm for cool store I and cool store II respectively. Meanwhile, the total yeast count was $37x10^2$ and $42x10^2$/gm of poultry for such examined stores respectively. (Jose, 2005) who found that the initial level of yeasts on chilled stored rabbit carcasses was 3.46+ 0.32 which grew faster than the remaining microorganisms and became predominant at the end of the shelf life. Table (9): indicated that yeast species isolated from examined surfaces of rabbit carcasses samples were *Candida, Rhodotorula, Sacchromyces, Torulopsis*. The previous result agreed with (Hussein, 1995) who examined mycologically 100 random samples of frozen poultry and poultry products the isolated yeast species were *Candida, Torulopsis, Rhodotorula, Saccharomyces* and *Trichosporon pullulans* with varying total percentages ranged from 5% to 24%. But different results obtained by (Abdel-Rahman and Yassien, 1995) They obtained 100 samples of frozen meat that were subjected to mycological examination as the isolated yeast genera were *Debaryomyces, Saccharomyces, Rhodotorula, Torulopsis, Endomyces, Trichosporon, Cryptococcus, Candida and Pichia* , respectively.

5. Conclusion

The present study concluded that rabbit carcasses and can contribute to mycological risk and contamination . Consequently , strict maintenance of good practices of slaughter hygiene, strengthened by maintaining the cold chain during transport, distribution and carcass commercialization is of central importance to ensure both public health protection and meat quality .

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التقييم الميكولوجى لذبائح الأرانب

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الملخص العربي

قد أجريت هذه الدراسة لتقييم التلوث الفطري لذبائح الأرانب، وأخترها على الصحة العامة .جمعت مجموعه من100 مسحة من سطوح الربع الأمامي والخلفي لذبائح الأرانب الطازجة والمجمدة (25 لكل منهما) من المجازر المختلفة للفحص الفطري .بالنسبة للفطريات تراوحت العد في عينات الفحص من الربع الأمامي الطازجة والربع الخلفي الطازجة من 1×10^2حتي 1.5×10^3 و 1.0×10^2 حتي 2.6×10^3 على التوالي، مع متوسط قيمة $5.80 \times 10^2 \pm 1.06 \times 10^2$ (cfu/cm^2) و$6.50 \times 10^2 \pm 1.29 \times 10^2$ (cfu/cm^2) على التوالي، وقد تراوحت فى الربع الأمامي المجمد و الربع الخلفي المجمد من 1.0×10^2 حتي 2.0×10^2 و1.20×10^2 حتي 4.0×10^2 على التوالي، مع متوسط قيمة $1.20 \times 10^2 \pm 0.17 \times 10^2$ (cfu/cm^2)و$1.60\times 10^2 \pm 0.48 \times 10^2$ (cfu/cm^2) على التوالي .وكان الكشف عن أن الأنواع العفن المعزولة من ذبائح الأرانب كانت الاسبيرجلس ، ميوكر، البنسليوم، الترناريا، الفيوزاريوم، جيوتريكم وسكوبيلوريابسس كما تم الكشف عن سلالات الاسبيرجلس وهى اسبيرجلس نيجر ، اسبيرجلس فلافس ، اسبيرجلس فيوميجاتس .أيضا في هذه الدراسة القيمة المتوسطة من الأفلاتوكسين (ميكروغرام / لتر (المستخرجة من سلالات تسمم من أسبيرجلس فلافس المعزولة من عينات فحص من الارانب الربع الأمامي الطازجة و الربع الخلفي المجمدة كانت B1 41.04 ± 1.65 ، B2 ± 1.26 29.87، G1 0.90 ± 15.41، G2 0.49 ± 9.38، و3.28 ± 76.85 B1، B2 ± 2.39 57.14، G1 ± 2.12 40.53، ± 19.66 G2 1.25، على التوالي . وكانت نتيجة العد للخمائر تراوحت في عينات الفحص من الربع الأمامي الطازجة والربع الخلفي الطازجة من 2.0×10^2 حتي 1.0×410 و 2.0×10^2 حتي 9.3×10^3 على التوالي، مع متوسط قيمة $3.57 \times 10^3 \pm 0.84 \times 10^3$ (cfu/cm^2)و$1.81\times 310 \pm 0.25 \times 10^3$ (cfu/cm$_2$) على التوالي، وقد تراوحت عينات الربع الأمامي الطازجة والربع الخلفي المجمدة من 1.0×10^2 حتي 7.0×10^2 و 1.0×10^2حتي 1.3×10^3 على التوالي، مع متوسط قيمة $4.33 \times 10^2 \pm 0.62 \times 10^2$ (cfu /cm^2) و$3.86\times 10^2 \pm 0.58 \times 10^2$ (cfu/cm^2) على التوالي .وكان الكشف عن أن الأنواع الخميرة المعزولة من ذبائح الأرانب كانت الكانديدا ، رودوتوريولا ، سكارومايسس ، توريولبسس .وخلصت الدراسة إلى أن ذبائح الأرانب يمكن أن تسهم في خطر الفطريات والتلوث .بالتالي، يجب ان يكون هناك صيانة صارمة من الممارسات الجيدة للنظافة والذبح، من خلال الحفاظ على سلسلة التبريد أثناء النقل والتوزيع والتسويق الذبائح هو من الأهمية المركزية لضمان حماية كل من الصحة العامة وجودة اللحوم.

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