SANITARY STATUS OF PACKED MEAT AND MEAT CONTACT SURFACES IN A MEAT PLANT

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Abstract

Seventy-five random samples of chilled packed meat were taken from a meat plant at early morning, mid day and at the end of the day (25 samples of each). Twenty-five random samples of frozen packed meat were taken from the freezing room of the same meat plant, fifteen surface swabs each of workers hands, meat preparing tables, knives, boxes as well as twelve samples of balances and five samples of packages were taken at intervals from the same meat plant. All samples were analysed to determine the Aerobic plate count Psychrotrophic, Enterobacteriacae, Coliform (MPN), Faecal coliform (MPN) and *E.coli* (MPN) counts, identification of isolated Gram-negative bacteria, identification of isolated coliform micro-organisms and isolation and identification of enterobacteriacae. The obtained results revealed that the microbial load of chilled packed meat and meat contact surfaces were slightly increased by time .

INTRODUCTION

Inhibition of bacterial growth and increasing the shelf life of packed meat by low temperature as in case of freezing and chilling have been extensively investigated (Niazi and Refai 1988 and Vanloack and Simulders 1991). In this respect, Weiser (1962) concluded that the lethal effect of freezing may be due to the denaturation of cell protein. However, it seems that some of the bacterial cells have the

ability to survive in cool environment; this is substantiated by the success of Ray and Speck (1973). Moreover, workers hands and their clothes, hands of butchers, unclean towels, cutting boards, slicing machine, water, air, knives, brushes and deboning machines can harbour substantial microbial populations. They are considered potential sources of micro-organisms on meat (Gork 1985). In this respect, Elmossalami *et al.* (1963) revealed that every 1 cm^2 of washing cloths may contain up to $3x10^7$ organisms, such cloths may act as a microbial transmitter to meat.

Therefore, the present study was initiated to determine the sanitary status of packed meat and meat contact surfaces.

MATERIALS AND METHODS

Sampling

A . Packed meat

Seventy five samples of chilled packed meat were taken from the meat plant at the end of production line at early morning , at mid-day and at the end of day (25 samples of each), twenty-five random samples of frozen packed meat were taken from the freezig room of the same meat plant.

B. Swabs

Fifteen surface swab samples each of workers hands, meat preparing tables, knives, boxes (five samples each at early morning, at mid-day and at the end of day) as well as twelve swab samples of balances (four smaples each at early morning, midday and at the end of day) and five swab samples of packages were collected in their original package, transferred to the laboratory with minimum of delay and subjected to the required bacteriological examination.

Handling and preparation of collected samples were carried out according to the techniques recommended by ICMSF (1978) and Favero *et al.* (1988).

Methods of enumeration:

Determination of Aerobic Plate Count (APC):

The drop plate technique recommended by ICMSF (1978) was used.

Determination of Psychrotrophic Count :

The drop plate technique recommended by A.P.H.A. (1972) was used.

Determination of Enterobacteriacae Count:

The same technique of the drop plate method was applied using violet red bile glucose agar.

Determination of Coliforms Count (MPN):

The multiple 3 tube fermentation technique recommended by ICMSF (1978) and ISO (1975) was used.

Determination of Faecal Coliforms Count (MPN):

Using the method recommended by ISO (1975).

Determination of *E. coli* Count. (MPN):

According to the technique outlined by A.P.H.A. (1972) and ISO (1975).

Identification of isolated strains :

Identifcation of isolated Gram-negative bacteria

All Gram negative isolates were identified according to the schemes developed by Vanderzant and Nicherson (1969).

Identification of isolated Coliform organisms :

The isolated strains were confirmed by biochemical tests (IMVIC) as outlined by ICMSF (1978).

Isolation and Identification of Enterobacteriacae with special reference to Salmonella and Shigella:

Pre-enrichment was carried out using buffered peptone water recommended by ICMSF (1978), followed by using Rappaport's Vassiliadis (RV) broth, then plating on Xylose Lysine Desoxycholate agar (XLD) and Salmonella Shigella agar (SS). Separate Colonies of typical growth were picked up and purified on a slope nutrient agar for further identification.

Morphological examination :

Isolated strains were subjected to Gram stain by the technique recommended by Cruickshank *et al.* (1975).

Biochemical identification :

Isolates were biochemically identifed according to the technique recommended by Edward's and Ewig (1972).

Serological identifcation :

Isolated Samonellae were subjected to serological identification by the slide agglutination technique using standard Salmonella polyvalent and monovalent (OH agglutination sera) Wellcome Foundation Limited, Bartford England DA 15 All) to determine the antigenic formula of Sallmonella strains, Kauffmann white scheme (Kauffmann 1974).

Isolated *E.coli* strains were identified serologically using diagnostic polyvalent and monovalent (OK sera) " Wellcome *E.coli* agglutination sera" to identify the "O" antigen.

RESULTS AND DISCUSSION

From the results achieved in Table 1, it can be concluded that the average Aerobic plate count (APC), Psychrotrophic, Enterobacteriacae, Coliforms (MPN), Faecal coliforms (MPN) and *E.coli* counts of chilled packed meat at early morning were $9.5x10^5$, $1.18x10^4$. $2.6x10^4$, 105.6, 22.6 and 10.5 respectively, where they were increased to $1.5x10^6$, $4.1x10^4$, 6.8×10^4, 187.5, 54.08 and 13.7 at the mid-day. They reached the maximum count at the end of the day where they were 6.9x10, 6.8×10^4 , $2.6x10^5$, $1.3x10^3$, 168.6 and 40.7, respectively, while counts were $3.9x10^5$, 1.3×10^4, $7.1x10^3$, $1.5x10^2$, 102 and 55.6 in frozen packed meat maples.

The results of (APC) of chilled packed meat obtained in this investigation are higher than those reported by Decun *et al.* (1975), ($2x10^5$) . Smith *et al.* (1975) found samples of packed meat attaining Psychrotrophic count ($4.4x10^6$). This substantiates the findings reported in the present ivestigation. The results of Enterobacteriacae count are in consistent with those reported by Reuter (1972), (10^4) .

Table 1. Statistical analytical results of microbiological examination of packed meat.

Bacterial count	Chilled packed meat						Frozen packed meat					
	Positive						Positive					
	NO	NO	%	Mean	S.E.	Log mean	NO	NO	%	Mean	S.E.	Log mean
Aerobic Plate												
A	25	25	100	$9.5x10^5$	$\pm 2.8x10^5$	5.68	25	25	100	$3.9x10^5$	$\pm 8.5x10^4$	5.59
B	25	25	100	$1.5x10^6$	$\pm 35.10^6$	6.18						
C	25	25	100	$6.9x10^6$	$\pm 1.9X10^6$	6.8						
Psychrotropic												
A	25	25	100	$1.8x10^4$	± 13.093	4.25	25	25	100	$1.3x10^4$	$\pm 3.8x10^3$	4.11
B	25	25	100	$4.1x10^4$	$\pm 2.3x10^4$	4.61						
C	25	25	100	$6.8x10^4$	$\pm 2.8x10^4$	4.83						
Enterobactariacae												
A	25	25	100	$2.6x10^4$	$\pm 1.6x10^4$	4.4	25	25	100	$7.1x10^3$	$\pm 1.7x10^3$	3.85
B	25	25	100	$6.8x10^4$	$\pm 3.7x10^4$	4.8						
C	25	25	100	$2.6x10^6$	$\pm 1.6x10^6$	5.4						
Coliform (MPBN)												
A	25	23	92	105.6	±45.08	2.02	25	21	84	$1.5x10^5$	±52.2	2.18
B	25	24	%	187.5	±59.4	2.3						
C	25	25	100	13.x103	$\pm 58x10^2$	3.1						
Faeca coliform												
A	25	20	80	22.6	±8.27	1.35	25	19	76	10^2	± 53.3	2
B	25	23	92	54.08	±20.27	1.73						
C	25	24	96	168.6	±48.5	2.23						
E. Coli												
A	25	11	44	10.5	± 4.2	1.02	25	9	36	55.6	±39.4	1.75
B	25	14	56	13.7	± 4.3	1.14						
C	25	19	78	40.7	± 11.5	1.61						

Concerning the most probable number (MPN) of coliforms and feacal coliforms, higher findings were recorded by Prasovska *et al.* (1990) , (1.9×10^5) . The presence of *E. coli* in packed meat higher than 10^2 cells/g was an indication for dangerous contamination of food, and this substantiates the findings reported by Miskimin *et al.* (1976). Regarding the frozen packed meat, (ABC) are inconsistent with these reported by Oblinger and Kennedy (1978), (1.1 x 105). Yassin (1988) found samples of meat attaining coliforms count (4.1×10^2)and this substantiates the findings reported in the present ivestigation . E.coli count is inconsistent with that reported by Oblinger and Kennedy (1978) (0-35).

The mean values of workers hands were 1.1×10^4 , 6.2×10^2, 1.2×10^2 , 67,11.2 and <3 in early morning for APC, Psychrotrgohic, Enterobacteriacae, Coliforms (MPN), Faecal coliforms (MPN), and *E. coli* counts respectively . They were 2.06×10^4 , 9.2×10^2 , 2.08×10^2, 1.4×10^2 and< 3 at the end of the mid-day, while they were 3.7×10^4, 1.5×10^3, 2.6×10^2, 3.4×10^2, 29.4 and 3.4 at the end of the day.

The average counts of preparing tables were 9.4×10^4 , 6.1×10^3, 6.9×10^3, 62.2, 5.6 and <3 at early morning, while at the mid-day they were 2.04×10^5, 1.3×10^4, 1.2×10^4, 2.1×10^2. 10.4 and 3.2 where they were 3.9×10^5, 2.8×10^4, 2.2×10^4, 5.1×10^2, 21 and 5.8 at the end of the day. On the other hand, knives showed a slight reduction in the average microbial counts, they were 3.6×10^3 , 7.8×10^2, 1.7×10^2, 41.8., 3.2 and <3 at the early morning, 4.3×10^3 , 4.8×10^2, 3.7×10^2, 3.3×10^2, 7.8 and <3 at the mid-day ad 1.3×10^4 , 1.04×10^3 , 8.1×10^2, 4.3×10^2, 16.8 and 4 at the end of the day. Moreover , the average bacterial counts of examined boxes were 9.4×10^4, 3.8×10^3, 1.4×10^4, 16, 3.4 and <3 at early morning and 3.1×10^5 , 7×10^3, 3.3×10^4, 1.2×10^2, 7.2 and < 3 at the mid day, while at the end of the day they were 2×10^6, 1.7×10^4, 6.8×10^4, 3.9×10^2, 21.2 and 3.6, while in balances, they were 2.9×10^4 , 3.1×10^3, 2×10^3 , 15.5, 3.25 and < 3 at the early morning, where at the mid day they were 8×10^4, 3.9×10^3, 4×10^3, 28.75 , 5.25 and < 3, while at the end of the day they were 1.7×10^5, 7.7×10^3, 1.4×10^4, 1.5×10^2,12 and < 3. In case of packages, Aerobic plate count, Psychrotrophic, Enterobacteriacae, Coliforms Faecal coliforms and *E. coli* counts were 1.8×10^2, 56, 44, 3.2, 3and <3, respectively, (Table 2).

The obtained results of APC, Coliforms, Faecal colifroms and E.coli of workers hands were lower than those reported by Al-Cherif (1983) (3.4×10^6, 4.2×10^3, 3.7×10^2 and 98.94×10^3), respectively, while Enterobacteriacae counts were in-

Table 2. Statistical analytical results of microbiological examination of meat contact surfaces.

Bacterial count	Waker's hands (count / cm2)						Preparing tables (count/cm2)						Knives (count/cm2)					
	Positive						Positive						Positive					
	NO	NO	%	Mean	S.E	Log mean	NO	NO	%	Mean	S.E.	Log mean	NO	NO	%	Mean	S.E.	Log mean
Aerobic Plate																		
A	5	5	100	$1.1x10^4$	$\pm5.4x10^3$	3.73	5	5	100	$9.4x10^4$	$\pm2.5X10^4$	4.97	5	5	100	$3.6X10^3$	$\pm1.5X10^3$	3.56
B	5	5	100	$2.06x10^4$	$\pm7.1x10^3$	3.85	5	5	100	$2.04x10^6$	$\pm7.7X10^4$	5.31	5	5	100	$4.3X10^3$	$\pm1.7X10^3$	3.63
C	5	5	100	$3.7x10^4$	$\pm1.3x103$	3.11	5	5	100	$3.9x10^6$	$\pm1.6X10^6$	5.59	5	5	100	$1.3X10^3$	$\pm4.7X10^3$	4.11
Psychrotropic																		
A	5	5	100	$6.2x10^2$	$\pm1.5x10^2$	2.18	5	5	100	$6.1x10^3$	$\pm1.9X10^3$	3.79				$7.8X10^2$	$\pm1.2X10^2$	2.89
B	5	5	100	$9.2x10^4$	$\pm2.6x10^2$	2.41	5	5	100	$1.3x10^4$	$\pm4.9X10^3$	3.69	5	5	100	$4.8X10^2$	$\pm1.2X10^2$	3.68
C	5	5	100	$1.5x10^3$	$\pm4.4x10^2$	2.64	5	5	100	$2.8x10^4$	$\pm1.05X1^4$	4.02	5	5	100	$1.04x10^3$	$\pm2.3X10^3$	3.02
Entarobactariacae																		
A	5	4	80	$1.2x10^2$	±31.2	1.49	5	5	100	$6.9x10^3$	$\pm3.2X10^3$	3.84				$1.7X10^2$	±65.8	2.23
B	5	5	100	$2.9x10^2$	±43.7	1.64	5	5	100	$1.3x10^4$	$\pm6.5X10^3$	4.08	5	4	80	$3.7X10^2$	±102	2.57
C	5	5	100	$2.6x10^2$	±45.6	1.66	5	5	100	$2.2x10^4$	$\pm1.2X10^4$	4.34	5	5	100	$8.1X10^2$	$\pm3X10^2$	2.91
Coliform (MPBN)																		
A	5	3	60	67	± 33	1.52							5	3	60	41.8	±17.9	1.62
B	5	3	60	$1.4x10^2$	±85	2.15	5	4	80	62.2	± 34 ±102	1.79 2.32	5	3	60	3.3X102	±1.8X10²	2.52
C	5	5	100	$3.4x10^2$	±187.3	2.53	5	5	100	$2.1X10^2$ $5.1X10^2$	$\pm2.1X10^2$	2.71	5	3	100	4.3X102	±1.9X10²	2.63
Faeca coliform																		
A	5	2	40	112	±6.5	1.05	5	2	40			0.75	5	1	20		±0.18	
B	5	2	40	112	±6.5	1.05	5	4	80	5.6	±2.1 ±2.5	1.02	5	2	40	3.2	±2.6	0.51
C	5	5	100	29.4	±1.4	1.47	5	5	100	10.4 21	±5.3	1.32	5	2	40	7.8 16.8	±6.1	0.89 1.23
E. Coli																		
A	5	0	0	<3	0	0.48	5	0	0	<3	0	0.48	5	0	0	<3	0	<0.48
B	5	0	0	<3	0	<0.48	5	1	20	3.2	±0.18	0.51	5	0	0	<3	0	<0.48
C	5	2	40	3.4	±0.22	0.53	5	3	60	5.8	±2.06	<0.76	5	2	40	4	±0.7	0.60

Table 2. (cont.)

Bacterial count	Chilled packed meat						Frozen packed meat						Frozen packed meat					
	Positive						Positive						Positive					
	NO	NO	%	Mean	S.E.	Log mean	NO	NO	%	Mean	S.E.	Log mean	NO	NO	%	Mean	S.E.	Log mean
Aerobic Plate																		
A	5	5	100	$9.4X10^4$	$\pm2.4X10^4$	4.47	4	4	100	$2.9x10^4$	$\pm2.4x10^4$	4.49	5	5	100	1.8x102	± 33.5	2.26
B	5	5	100	$3.1X10^5$	$\pm6.2X10^4$	5.49	4	4	100	$8.0 x10^4$	$\pm3.7x10^4$	4.90						
C	5	5	100	$2.0X10^6$	$\pm7.6X10^5$	5.88	4	4	100	$1.7x10^5$	$\pm7.4x10^4$	5.23						
Psychrotropic																		
A	5	5	100	$3.8X10^3$	$\pm10^3$	3.58	4	3	75	$3.1x10^3$	$\pm1.5x10^3$	3.49	5	3	60	56	±14.3	1.72
B	5	5	100	$7.0x10^3$	$\pm8.0X10^2$	3.85	4	3	75	$3.9x10^3$	$\pm1.8x10^3$	3.59						
C	5	5	100	$1.7X10^4$	$\pm7.3X10^3$	4.23	4	3	75	$7.7x10^3$	$\pm4.0x10^3$	3.89						
Enterobactariacae																		
A	5	5	100	$1.4X10^4$	$\pm4.4X10^3$	4.15	4	3	75	$2.0x10^3$	$\pm1.2x10^3$	3.30	5	3	60	44	±8.7	1.64
B	5	5	100	$3.3X10^4$	$\pm10^4$	4.52	4	3	75	$4.0x10^3$	$\pm2.1\pm10^3$	3.60						
C	5	5	100	$6.8X10^4$	$\pm7.7X10^3$	4.83	4	3	75	$1.4x10^4$	$\pm10^4$	4.15						
Coliform (MPBN)																		
A	5	5	100	16	±630.1	1.20	4	1	25	15.5	±10.8	1.19	5	2	40	32	±0.17	0.51
B	5	5	100	$1.2X10^2$	±33	2.08	4	3	75	28.75	±20.3	1.46						
C	5	5	100	$3.9X10^2$	$\pm1.7X10^2$	2.59	4	3	75	$1.5x10^2$	±93.9	2.18						
Faeca coliform																		
A	5	2	40	3.4	±0.22	0.53	4	1	25	3.25	±0.22	0.51	5	0	0	<3	0	<0.48
B	5	4	80	7.2	±1.9	0.86	4	3	75	5.25	±0.89	0.72						
C	5	5	100	21.2	±7	1.33	4	3	75	12	±2.6	1.08						
E. Coli																		
A	5	0	0	<3	0	<0.48	4	0	0	<3	0	<0.48	5	0	0	<3	0	0.48
B	5	0	0	<3	0	<0.48	4	0	0	<3	0	<0.48						
C	5	3	60	3.6	±0.22	0.56	4	0	0	<3	0	<0.48						

consistant with those reported by Yassin (1988) ($6.6x10^2$) and Mira (1989), (10^3).

Yassin (1988) found that APC and Psychrotrophic count of preparing tables were $4.9x10^5$ and $3x10^4$, respectively. These substantiate the findings reported in the present investigation, while higher findings of Colifroms, Faecal coliforms and *E.coli* were reported by Al-Cherif (1983), ($1.7x10^3$, $2.3x10^2$ and $2.1x10^2$, respectively.

Moreover, the obtained results of APC, Enterobacteriacae, Colifrom counts of examined knives were lower than those obtained by El-Daly (1983) ($2x10^6$, $4.x10^4$ and $2x10^6$) , respectively. Knives may add a great number of micro - organisms to meat which come in contact with them . This substantiates the findings reported by Frazier and Westholf (1978). Generally , it is clear from the obtained results that the microbial counts of packed meat and meat contact surfaces slightly and progressively increased with time, and these agree with those previously reported by Stringer *et al.* (1969).

Table 3 illustrates the incidences of isolated Gram-negative organisms. It can be concluded that *Acinetobacter, Enterobacter agglomerans,* and *cloacae, Klebsiella Ozonae, Proteus morganii, Serratia liquificans, Salmonella typhimurium* and *Salmonella* stanley could be isolated from chilled packed meat only with variable percentages from swabs of workers hands, preparing tables, knives and boxes, *Aeromonas Citrobacter freundii, Klebsiella aerogenes* and *E.coli* type II could be isolated , while *Proteus vulgaris* was found in two of the frozen packed meat samples only. Moreover, *Achromobacter, Klebsiella pneumonae* and *E.coli* type I were found to exist in chilled packed meat. One strain of $O_{119}:K_{69}:B_{14}$at early morning, while at the mid day , two strains $O_{44}:K_{74}$ and $O_{112}: K_{66}:B_{11}$ were isolated , while four strains of *E.coli* could be isolated at the end of the day. One strain could be identified as $O_{111}: K_{58}:B_4$ and the other three strains were identified as $O_{111}:K_{69}:B_{14}$. One strain of $O_{119}:K_{69}:B_{14}$.could be isolated and serologically identified from examined samples of frozen packed meat . From boxes, one strain $O_{119}:K_{69}:B_{14}$ could be isolated, while *Enterobacter aerogenes* and *Proteus mirabilis* could be isolated from chilled packed meat, frozen packed meat, workers hands, preparing tables and balances. *Pseudomonas aerogenes* and *Shigella bedyii* were found to exist in chilled packed meat samples and boxes only. The presence of coliform bacteria is a significant indicator of lack of clean lines and/or bad hygienic measures possible presence of en-

Table 3 Frequency distribution of isolated Gram negative arganisms.

Isnlated or-ganisms	Chilled packed meat						Frozen packed meat		Worker's hands						Preparing tables					
	A		B		C				A		B		C		A		B		C	
	NO	%	No	%	No	%	No	%	NO	%	No.	%	No.	%	NO	%	No.	%	No.	%
Aeromonas	4	16	4	16	6	24	-	-	1	2	-	-	3	40	1	20	1	20	-	-
Achromobcter	-	-	1	4	2	8	3	12	-	-	-	-	-	-	-	-	-	-	-	-
Acinitobacter	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Citrobacter	9	36	10	40	15	60	6	24	1	20	2	40	2	40	2	40	2	40	3	60
Enterobacter aerogens	7	28	7	28	9	36	5	20	2	40	3	60	3	60	1	20	-	-	1	-
agglomerons	2	8	2	8	4	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cloacae	1	4	1	4	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Klebsiella aerogens	4	16	3	12	7	28	4	16	1	20	1	20	2	40	1	20	2	40	1	-
pneumonae	3	12	3	12	4	16	3	12	-	-	-	-	3	-	-	-	-	-	-	-
ozonae	1	4	1	4	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ps.aerogens	4	16	4	16	6	24	-	-	-	-	1	20	-	-	-	-	-	-	-	20
Proteus mirabilis	3	12	3	12	5	20	2	8	1	20	-	-	1	20	-	-	-	-	1	-
morgani	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
vulgaris	-	-	-	-	-	-	2	8	-	-	-	-	-	-	-	-	-	-	-	-
Shigella bedyii	1	4	1	4	3	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flexneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Serratia liguificans	-	-	1	4	3	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E.coli type I	3	12	5	20	7	28	1	4	-	-	1	20	2	40	-	-	-	-	-	-
type II	2	8	4	16	5	20	3	12	-	-	-	-	1	20	2	40	2	40	2	40
Salmonella																				
typhimurium	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
stanley	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cont. Table 3 .

Isnlated organisms	Chilled packed meat						Frozen packed meat		Worker's hands						Preparing tables					
	A		B		C				A		B		C		A		B		C	
	NO	%	No	%	No	%	No	%	NO	%	No.	%	No.	%	NO	%	No.	%	No.	%
Aeromonas	1	20	1	20	1	20	1	20	-	2	-	-	-	1	20	1	2	40	1	20
Achromobcter	-	-	-	-	-	-	-	-	1	-	20	1	20	-	-	-	-	-	-	-
Acinitobacter	-	-	-	-	1	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Citrobacter	1	20	-	-	2	40	2	40	2	20	40	3	60	-	-	-	-	-	2	40
Enterobacter aerogens	1	20	1	20	2	40	-	-	-	40	-	-	-	1	20	1	2	40	1	20
agglomerons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cloacae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Klebsiella aerogens	-	-	1	20	2	40	1	20	1	20	20	2	40	1	20	1	2	40	-	-
pneumonae	-	-	-	-	-	-	-	-	-	-	-	1	20	-	-	-	1	20	-	-
ozonae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ps.aerogens	1	20	2	40	2	40	1	20	1	-	20	2	40	1	20	-	-	-	-	-
Proteus mirabilis	-	-	-	-	-	-	-	-	1	20	20	-	-	-	-	1	2	40	-	-
morgani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
vulgaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shigella bedyii	-	-	-	-	-	-	-	-	1	-	20	1	20	-	-	-	-	-	-	-
Flexneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Serratia liguificans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E.coli type I	1	20	-	-	1	20	2	40	2	-	40	3	60	-	-	-	-	20	-	-
type II	1	20	2	40	1	20	1	20	1	-	20	1	20	-	-	-	1	-	-	-
Salmonella																				
typhimurium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
stanley	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

teric pathogens may constitute a public health hazard for human consumers (Chambers *et al.*1976). In this respect, Citrobacter freundii and Klebsiella aerogenes were found to be implicated in urinary tract infection (Krige and Holt1984), while klebsiella pneumonae was found to be associated with pneumonia and lung abscess in man Pyatkin and Krivoshein, 1980).Proteus species have been implicated in cases of summer diarrhoea in infants (Hassan1983). The presence of Serratia species were associated with meningitis, otitis media, sinusitis and infant diarrhoea (Frankel *et al.* 1970). *Shigellae* are not indigenous in foods, however, they cause outbreaks and have been transmitted through food contaminated by human excreters (Hobbs 1974) . Recognized *E.coli* serotypes are enteropathogenic for both human and warm blooded animals and responsible for gastroenteritis, severe diarrhoea in children, colibacillosis, appendicitis and nephritis (Marzouk 1985 and El mossalami *et al.* 1988). Moreover, Bryan (1982) reported that strain O_{112} is one of the serogroups of *E.coli* that have caused the invasive type of illness, while O_{44} , O_{111} and O_{119} have been shown to elaborate enterotoxing consumption of meat (Bryan 1980) . The presence of Pseudomonas indicated that fresh meat held at chill temperature was spoiled by superficial slime of such organism (Ingram and Dainty 1971).

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الحالة الصحية للحوم المعبأة والاسطح الملامسة لها في مصنع لحوم

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تم فحص ٧٥ عينة لحوم مبردة معبأة مأخوذة من مصنع لحوم فى بداية العمل ، عند منتصف اليوم وفى نهاية اليوم (٢٥ عينة من كل مرحلة) وكذلك ٢٥عينة من اللحوم المجمدة المعبأة تم سحبها من غرفة التجميد من نفس المصنع بجانب ١٥مسحة من ايدى العمال والمناضد الخاصة بتجهيز اللحوم والسكاكين والصناديق ، وايضا ١٢مسحة من الموازين وخمس عينات من أكياس التعبئةتم سحبها على فترات مختلفة من نفس المصنع. وتم تحليل جميع العينات لتحديدالعد البكتيرى الكلى للبكتريا الهوائية ، عدد الميكروبات المقاومة لدرجة الحرارة المنخفضة–عدد الميكروبات المعوية –وعدد الميكروبات القولونية وعدد الميكروبات القولونية البرازية وعدد ميكروبات الأشيريشيا كولاى . وتم تصنيف العترات المعزولة سالبة الجرام وكذلك الميكروبات المعوية . وكانت النتائج المستخلصة تشير إلى ان الحمل الميكروبى للحوم المبردة المعبأة والأسطح الملامسة لها يزداد بمرور الوقت .