Surface Contamination of Camel Carcasses

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ABSTRACT:

The surface contamination of camel carcasses was studied. Areas of 10 cm2 each from the surface of twenty five camel carcasses were swabbed before skinning, after skinning and after preparation and stamping.

The aerobic plate count, enterobacteriaceae count, *Staph. aureus* count, Coliforms (MPN), Fecal coliforms (MPN), *E. coli* (MPN) were determined as well as isolation and identification of salmonellae.

The mean values of aerobic plate count were 4 x 108, 5x103, 6.2x106 CFU/cm2. While for enterobacteriaceae count were 6.6x105, 8.2x102 and 6.2x104 CFU/cm2. In case of coliforms (MPN) were 6.3x105, 3.1x102 and 5.8x104 bacteria/cm2 on the surface of camel carcasses before skinning, after skinning and after preparation and stamping. While fecal coliforms (MPN) and E. coli (MPN)/cm2 were 2.6x103, 6.3x10 and 8.1x102 and 8.3x10, <3 and 2.3x102 bactria/cm2, respectively. In case of *Staph. aureus* counts were 7.2x105, 8.2x102 and 5.6x104 bacteria/cm2 on the surface of camel carcasses during the three stages.

Citrobacter freundii, Enterobacter aerogenes, Enterobacter cloacae, Enterobacter sakazaki, E. coli, Klebsiella pneumoniae, Proteus mirabilis, Proteus vulgaris, Morganella morganii, Salmonella enteritidis and *Salmonella typhimurium* were be isolated from the examined camel carcasses.

Public health significance of bacterial contamination of camel carcasses was discussed and suggestive measures for improvement of the microbial quality of camel carcasses were mentioned.

INTRODUCTION:

A high standard of hygiene and adequate control measures are particularly important in abattoirs. It has been found that outbreaks of food-borne diseases can be prevented by constant supervision of these establishment and by checking the sanitary condition, of the surface and equipment in constant contact with meat (Yassien, 1992).

The external contamination of meat constitutes a constant problem in most developing countries in the abattoir itself where there are many of potential sources of infection by microorganisms (Lawrie, 1979).

The microbial surface contamination of carcasses has been repeatedly reported to have a significant effect on the meat shelf life. Moreover, contaminants may also include pathogens which can penetrate into the meat (Elmossalami & Wassef, 1971).

It was established that the hide of the animal and water used to wash the carcasses were main sources of both mesophilic and psychrotrophic microorganisms on carcasses (Nottingham et al. 1974 and Samaha & Draz, 1993).

Elmosssalami (1988) recorded an aerobic plate count of 2x104 CFU/cm2 on shoulder and 4x103 CFU/cm2 on thigh of cattle after preparation while enterobacteriaceae count proved to be 3x102 and 8x102 CFU/cm2 on shoulder and thigh, respectively. Coliforms were detected in 45, 85 and 90% of shoulders after skinning, preparation and after preparation and stamping, respectively.

Hamdy (1989) reported that the mean aerobic plate count on the surface of camel carcasses were 1.5x108, 9.6x103 and 7.2x105 CFU/cm2 before skinning, after skinning and after preparation and stamping respectively. While the mean enterobacteriaceae counts were 1.2x105, 4.8x102 and 8.8x103 CFU/cm2 before skinning, after skinning and after preparation and stamping, respectively.

Mira (1989) reported that the mean values of aerobic plate count/cm2 on the shoulder were 6x104, 106 and 2x104 after skinning, evisceration and after 24 hours chilling respectively. The enterobacteriaceae counts were 2x104, 2x105 and 2x104 CFU/cm2 but the coliforms counts were 19, 21 and 26 bacteria/cm2 on the shoulder after skinning, evisceration and 24 hours chilling, respectively.

Samaha and Draz (1993) examined 75 swabs from the surface of cattle carcasses after evisceration. The mean total bacterial, enterobacteriaceae, coliforms, enterococci and Staph. aureus counts were 5.4.x103, 8.9x103, 4.8x103, 2.3x103 and 8x102 CFU/10 cm2 of cattle carcasses surfaces inside the slaughter halls at Alexandria city, Egypt.

The present study was undertaken to determine the bacteriological status of camel carcass surfaces at Al-Ahsa abattoir.

MATERIALS AND METHODS:

Seventy five swabs were taken from the surface of fore quarter of camel carcasses at Al-Ahsa abattoir.

The swabs were taken from the surface (shoulder) of twenty five carcasses before skinning, after skinning and after preparation and stamping.

10 cm2 areas were swabbed using sterile cotton tampon and a metal template. Ringer's solution was used as rinsing and diluent fliued (ICMSF, 1978).

Aerobic plate count was applied using the drop technique recommended by the ICMSF (1978).

Enterobacteriaceae count was applied using violet red bile glucose agar (Gork, 1976).

Identification of enterobacteriaceae was done using API 20 E (Bio Merieux sa 69280 Marcy Etoile, France).

Coliforms most probable number (MPN), Fecal Coliforms (MPN) and *E. coli* (MPN) were applied according to the technique recommended by the ICMSF (1978).

Enumeration of coagulase positive *Staph. aureus* was applied using Baird-Parker medium (Thatcher & Clark, 1978). In addition trials were carried out for detection of Salmonella according to the technique recommended by Flowers et al. (1992).

RESULTS AND DISCUSSION:

From the results given in Table (1) it is evident that the mean aerobic plate counts on the surface of camel carcasses were 4x108, 5x103, 6.2x106/cm2 before skinning, after skinning and after preparation and stamping respectively. Nearly similar findings were recorded by Hamdy, 1989 while lower values were recorded on cattle carcasses by Elmossalami, 1988, Mira, 1989 and Samaha and Draz 1993. This may be attributed to the hygienic status adopted inside the slaughter halls. However, total viable

count has always been used as indicator to the hygienic condition inside the slaughter halls. The aerobic plate count is of great significance for judging of the hygienic conditions under which the meat was produced. It gives a good idea about the keeping quality of meat (Miskimin et al. 1976).

Etzel (1973) stated that the keeping quality of meat persisted till the count reached 3x107 bacteria/cm2 while Sovandia (1962) found that changes in odour could be noticed when the count reached 107 bacteria/cm2.

Concerning the mean value of enterobacteriaceae count on the camel carcasses, they were 6.6x105, 8.2x102 and 6.2x104 CFU/cm2 before skinning, after skinning and after preparation and stamping respectively. Similar finding was reported by Hamdy 1989; while lower results were obtained by Elmossalami (1988) and Samaha and Draz (1993). The presence of enterobacteriaceae indicates presence of toxigenic bacterial contamination in food which is a public health hazard (ICMSF, 1978).

The results presented in Table (1) indicated that the mean values of *Staph. aureus* count were 7.2x105, 8.2x102 and 5.6x104 CFU/cm2 before skinning, after skinning and after preparation and stamping of carcasses, respectively. Nearly similar findings were obtained by Hafez, (1995) on cattle carcasses, but higher counts than that were obtained by Hamdy (1989) on camel carcasses.

It has been reported by many investigators (Meyer, 1975; Niskanen & Normal, 1979; and Eley, 1992) that when the count of coagulase positive staphylococci reached 105 bacteria/g of product, it is sufficient to cause toxicosis to consumer.

The presence of *Staph. aureus* on food articles points to a possible contamination from the skin, mouth, nose of food-handlers. The inadequately cleaned equipment may be a source of contamination (ICMSF, 1978).

From the results displayed in Table (1) it is evident that the mean value of coliforms, fecal coliforms and *E. coli* (MPN) were 6.3x105, 2.6x103 and

8.3x10 bacteria/cm2 before skinning and 3.1x102, 6.3x10 and <3 bacteria/cm2 after skinning and 5.8x104, 8.1x102 and 2.3x102 bacteria/cm2 after preparation and stamping of camel carcasses. Lower finding was reported by Samaha and Draz (1993).

Tables (2) and (3) reveals the types and incidence of enterobacteriaceae isolated from examined samples of camel carcasses surfaces during the three stages which were: *Citrobacter freundii*, *Enterobacter aerogenes*, *Enterobacter cloacae*, *Enterobacter sakazakii*, *E. coli* (O26; K60 (B6), O55; K59 (B5), O111, K58 (B4), O119; K69; (B14) *Serratia liquefaciens*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Proteus vulgaris*, *Morganella morganii*, *Salmonella enteritidis* and *Salmonella typhimurium*. The same organisms were isolated by many authors with different percentages (Hamdy, 1989; Mira, 1989; and Samaha and Draz, 1993).

The public Health importance of enteropathogenic *E.coli* has been emphasized by many authors as it has been implicated in cases of gastroenteritis in man, epidemic diarrhea in infants, sporadic summer diarrhea in children (Krieg and Holt (1984) and Eley (1992). This organism has also been the most frequent cause of cystitis, pyelitis, pyelonephritis, appendicitis and peritonitis (Pyatkin and Krivoshein, 1980).

For the production of fresh meat of good microbiological quality, the recommended international codex of hygienic practice for fresh meat and for ante-and post mortem inspection of slaughter animals (Codex, 1976) should be followed. The most important practice that should be taken in consideration in camels slaughtering in Al-Ahsa abattoir are cleaning of dirty camels before slaughter, skinning camels while being on the rail, separation of carcasses from each other and avoid contact between the external surface of the hide and carcasses. Hygienic measures must be adequate to prevent spread of contamination via hands, knives, saws, equipment and clothing. Aerial contamination must be minimized by avoiding excessive manipulation of hides inside the abattoir.

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Tabel (4) : The effect of Hasawi Rice Hull inclusion in the grower diet on production traits of S. C. White Leghorn layers during 26 weeks of laying

Variation	FI	TEG	FC	EW	HD	WLIV	CLIV	SPG	HU	WT20	W36	WG
Among periods	NS	**	**	NS	**	NS	**	NS	**	*	NS	NS
G1 (5-8 weeks)	127.4	24.0^{a}	3.29^{a}	55.5	70.1^{b}	99.8	94.7^{a}	1.09	100.2^{a}	1301^{b}	1626	325
G2 (5-10 weeks)	125.2	24.8^{ab}	3.09^{b}	55.9	73.1^{a}	99.7	97.1^{b}	1.09	99.5^{b}	348^{a}	1662	313
G3 (5-12 weeks)	126.9	25.7^{b}	3.11^{b}	55.7	74.4^{a}	99.8	99.0^{c}	1.09	99.5^{b}	1319^{b}	1641	322
P>F	0.1900	0.0009	0.0209	0.5875	0.0091	0.5009	0.0001	0.5387	0.0081	0.8911	0.5193	0.9177
Among levels of rice hull, %												
	**	**	*	*	**	NS	**	NS	*	**	**	NS
0	129.1^{a}	25.7^{a}	3.16^{ab}	55.8^{ab}	74.4^{a}	99.9	97.6^{a}	1.09	99.9^{ab}	1378^{a}	1702^{a}	325
15	130.4^{a}	24.6^{a}	3.30^{a}	56.3^{a}	71.4^{ab}	99.9	97.3^{a}	1.09	100.0^{a}	1344^{a}	1639^{ab}	295
30	124.5^{b}	25.5^{a}	3.07^{b}	55.6^{ab}	74.7^{a}	99.6	97.2^{a}	1.09	99.8^{ab}	1338^{a}	1641^{ab}	303
50	122.0^{b}	23.5^{b}	3.13^{ab}	55.1^{b}	69.7^{b}	99.6	95.8^{b}	1.09	99.3^{b}	1232^{b}	1589^{b}	357
P>F	0.0001	0.0002	0.0827	0.0565	0.0046	0.0792	0.0424	0.2106	0.0812	0.0001	0.0239	0.2542
Period X levels	**	NS	NS	NS	NS	NS	*	NS	**	NA	NA	NA

FI : Feed intake, gm/b/d; TEG: Total number of eggs produced by the hen per period; FC : Feed conversion, Kg/Kg; EW : Egg weight, gm; HD : Hen-day egg production; WLIV: Weekly livability, %; CLIV: Cumulative livability, %; SPG: Specific gravity of the eggs; HU: Haugh unit (Albumin height)

WT20: Bird's weight at 20 weeks of age; Wt36: Bird's weight at 36 weeks of age; WG : Weight gain of the birds

** Significant, $P<0.01$; * Significant, $P<0.05$; NS Not significant, $P>0.05$; NA Not applicabale

Tabel (2) : Enterobacteriaceae isolated from the examined samples

Organisms	A		B		C	
	No.	%	No.	%	No.	%
Citrobacte freundii	*3*	*12*	*0*	*0*	*8*	*32*
Enterobacter aerogenes	*2*	*8*	*2*	*8*	*4*	*16*
Enterobacter cloacae	*1*	*4*	*0*	*0*	*3*	*12*
Enterobacter sakazakii	*0*	*0*	*0*	*0*	*5*	*20*
E. coli	*2*	*8*	*0*	*0*	*5*	*20*
Serratia liquefaciens	*6*	*24*	*3*	*12*	*7*	*28*
Klebsiella pneumoniae	*2*	*8*	*0*	*0*	*4*	*16*
Proteus mirabilis	*4*	*16*	*0*	*0*	*5*	*20*
Proteus vulgaris	*3*	*12*	*1*	*4*	*4*	*16*
Morganella morganii	*1*	*4*	*0*	*0*	*3*	*12*
Salmonella enteritidis	*0*	*0*	*0*	*0*	*2*	*8*
Salmonella typhimurium	*0*	*0*	*0*	*0*	*1*	*4*

Tabel (3) : Serotypes of isoalted *E. coli*

Serotypes	A		C	
	No.	%	No.	%
O26 : K60 (B6)	1	4	1	4
O55 : K59 (B5)	0	0	2	8
O111 : K58 (B4)	1	4	0	0
O119 : K69 (B14)	0	0	2	8

التلـوث السطحـي لذبـائح الجمـال

عبدالله محمد الدغيم و نبيل ياسين
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جامعة الملك فيصل - الأحساء

الملخص :

تم دراسة الحالة البكتريولوجيه لأسطح الجمال وذلك بأخذ ٧٥ مسحه من مساحة ١٠ سم٢ من أسطح خمسة وعشرون ذبيحة قبل وبعد السلخ وكـذلك بعـد تجهيـز الذبائح وختمها.

أوضحت النتائج على ما يلي :

عدد الميكروبات الهوائية ٤× ١٠^{٨} و ٥×١٠ ^{٣} و ٦,٢×١٠ ^{٦} بكتيريـا / سـم٢ بينما كان عدد الميكروبات المعوية ٦,٦×١٠ ^{٥} و ٨,٢×١٠ ^{٢} و ٦,٢×١٠ ^{٤} بكتيريا / سم٢ كما كان عدد ميكروبات القولـون ٦,٣×١٠ ^{٥} و ٣,١×١٠ ^{٢} و ٥,٨×١٠ ^{٤} بكتيريا / سم٢ . وبالنسبة لعدد الميكروبات القولون النوع البرازي فكان ٢,٦×١٠ ^{٣} و ٦,٣×١٠ و ٨,١×١٠ ^{٢} بكتيريا / سم٢ وكـان ٨,٣×١٠ و < ٣ و ٢,٣×١٠ ^{٢} بكتريا / سم٢ بالنسبة لميكروب الايشيريشيا كولاي . وكان عدد ميكروبات العنقودي الذهبي ٧,٢×١٠ ^{٥} و ٨,٢×١٠ ^{٢} و ٥,٦×١٠ ^{٤} بكتيريا / سم٢ على أسطح ذبـائح الجمال قبل وبعد تجهيز وختم الذبائح على التوالي.

ولقد تم عزل عدد من الميكروبات من جنس الايشيريشيا القولونيه ، انتيروبـاكتر فروندای وانتيروباكتر ايروجينيز وانتيروباكتر سكازاكي وكلبسيللانيموني والـبروتيس فليجارس والبروتيس ميرابيليس ومورجانيللا مورجاني وسالمونيلا انترتيدز وسـالمونيلا تيفموريم.

وقد تم مناقشة الأهمية الصحية للميكروبات المعزولة والإجراءات المقترحة لتحسين الجودة الميكروبية لذبائح الجمال.