Bacterial profile of bovine carcasses at abattoir

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A B S T R A C T

A grand total of 180 swabs representing 60 bovine carcasses were collected under aseptic conditions from different parts (hind quarter, abdomen and fore quarter) of the carcass surface at 2 Basatin abattoir halls in summer. Collected samples were subjected to bacteriological examination and the results of APC in the following region A1, A2, A3, B1, B2, B3 in hall 1 were $3.8 \times 10^4 \pm 3.4 \times 10$, $3.5 \times 10^4 \pm 2.1 \times 10^3$, $4.7 \times 10^4 \pm 3.1 \times 10^3$, $3.3 \times 10^4 \pm {}^{1.1} \times 10^3$, $3.3 \times 10^4 \pm 4.4 \times 10^3$, $4.4 \times 10^4 \pm 4.3 \times 10^3$. Concerning hall 2, such results were $4.6 \times 10^4 \pm 9.9 \times 10^3$, $5.7 \times 10^4 \pm 9.2 \times 10^3$, $4 \times 10^4 \pm 2.7 \times 10^3$, $6.4 \times 10^4 \pm 3.9 \times 10^3$, $3.3 \times 10^4 \pm 4.6 \times 10^3$ and $6 \times 10^4 \pm 4.8 \times 10^3$ respectively. On the other hand, *Salmonella Typhimurium* was isolated from the carcass swabs at a percentage 2.75% from A1, A2, B2, B3 parts. The analysis was carried out and the recommendations showed that the *Salmonella Typhimurium* antigenic structure acc. To serological identification was somatic (O) antigen 1, 4, (5), 12 and flagellar (H) antigen phase 1:1, phase 2:2.

Key words: Bovine carcass, Salmonella, Abattoir, Bacterial count, Meat contamination

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1. INTRODUCTION

In a living animal, the muscles are virtually sterile, but other parts of the animal like skins or guts contain an enormous amount of bacteria. Among them, there is a large number of *E. coli* which are often excreted or shed in the environment *(Brill, 2007).* These pathogens like Campylobacter, Salmonella and pathogenic *E. coli* can be colonized at the gastrointestinal tracts for a wide range of wild and domestic animals, especially animals raised for human consumption *(Meng et al., 1998)*. Thus, their prevalence may be attributed to either human handling or improper dressing, especially during the evisceration process. The infections caused by such Gram-negative bacteria are a worldwide public health problem *(Moehario et al., 2009)*. the presence of *E. coli* is thought to give an indication of faecal contamination (enteric pathogens in particular) than the entire group of *Enterobacteriaceae (Kagambèga et al., 2011). another* foodborne pathogen which is from the leading causes of illness and death in developing countries costing billions of dollars in medical care, medical and social costs is *Salmonella* species *(Fratmico et al., 2005)* which results in multiple cases of illness, hospitalization and death each year *(Center for Disease Control and Prevention (CDC), 1998)*. It was found that high levels of Salmonella spp. may be associated with animals slaughtered during a particular day and may lead to elevated levels of the organism on meat derived from such animals and once a production line is contaminated with Salmonella spp. the microorganism will establish itself on the machinery, equipment and hands of workers and cause cross-contamination *(Berends et al., 1997)* beside Salmonella was transferred from the hide to the carcass during de-hiding operations contaminating the carcass surfaces with microorganisms during skinning and evisceration as well as salmonella carrier as those working in slaughter houses can serve as a source of carcass contamination *(Nyeleti et al., 2000)* from the most common types of Salmonellae are *S. Typhimurium* and *S. Enteritidis* but a new strain of *S. typhimurium* DT_{104} is said to be resistant to seven different antibiotics that normally kill any other Salmonella strain; making treatment options more limited *(Zhao et al., 2002).* This is probably Due to the use of antibiotics for the promotion of growth and prevention of disease in food animals. there is an increase of human salmonellosis cases caused by food borne multi drug resistant (MDR) Salmonellae *(Young et al., 2001).*

So, this study was planned to determine aerobic plate count of carcass surfaces in different areas,

halls inside the abattoir in summer and isolation and identification of Salmonella spp.

2. MATERIALS AND METHOD

2.1. Samples

Swabs from three areas represented by A_1 (posterior part of leg), A_2 (abdomen) and A_3 (forearm) were collected from the surface of the carcass during summer from 2 halls of Cairo abattoir (El-Basaten, automatic abattoir) in summer June 2016

2.2. Determination of Aerobic Plate Count

First serial dilutions were prepared and from each dilution two nutrient agar plates were inoculated using Nutrient agar plates then, the inoculated plates were Incubated at 37^0 C in an inverted position for 24 hours
The average number of colonies was determined and the aerobic plate count was calculated.

2.3. Isolation and identification of Salmonellae

Salmonella Isolation and identification were carried out according to FDA using Rappaport Vassiliads enrichment broth and XLD agar medium. The presumptive colonies of salmonella were picked up for further biochemical and serological identification according to Kauffman White Scheme ز

3. RESULTS

As it's shown in Table (1) that the mean value of A_1 (posterior part of leg) is 3.8 $x10^4$±3.4 $x10^3$ with min. value 2.6 $x10^4$ and max. value 5 $x10^4$, A_2 (abdomen) and A_3 (forearm) were 3.5 $x10^4$±2.1 $x10^3$, 4.7 $x10^4$±3.1 $x10^3$ with min. value 2.7 $x10^4$ and 4.1 $x10^4$ and max. value4.2 $x10^4$ and 6 $x10^4$ respectively. The Mean value of B_1 (posterior part of leg), B_2 (abdomen), B_3 (forearm) were 3.3 $x10^4$ ± 1.1 $x10^3$, 3.3 $x10^4$±4.4 $x10^3$, 4.4 $x10^4$±4.3 $x10^3$ respectively. with min. value 2.9 $x10^4$,2.1 $x10^4$ and 3.6 $x10^4$ respectively and max. value3.7 $x10^4$,5.1 $x10^4$ and 6.2 $x10^4$ respectively. As it's shown in The Table that the mean value of A_1(Posterior part of leg) is 4.6 $x10^4$±9.9 $x10^3$ with min. value 7.1 $x10^3$ and max. value 7.1 $x10^4$. While A_2 (abdomen) and A_3 (forearm) mean values were 5.7 $x10^4$±9.2 $x10^3$, 4 $x10^4$±2.7 $x10^3$ respectively with min. and max. values 2.1 $x10^4$, 3.1 $x10^4$ and 8.1 $x10^4$, 5 $x10^4$ respectively.

The Mean values of B_1 (posterior part of leg), B_2 (abdomen), B_3 (Forearm) were 6.4 $x10^4$±3.9 $x10^3$, 3.3 $x10^4$±4.6 $x10^3$ and 6 $x10^4$±4.8 $x10^3$ and min. values were 5.1 $x10^4$, 2.3 $x10^4$ and 4.2 $x10^4$ respectively. Max. values were 7.8 $x10^4$, 5.2 $x10^4$ and 7.5 $x10^4$ respectively.

Table (1): Statistical analytical results of APC in different regions of the carcass during summer season in hall 1.

Region	APC			
	Mean	SE	Min	Max
A1	3.8 $x10^4$abc	3.4 $x10^3$	2.6 $x10^4$	5 $x10^4$
A2	3.5 $x10^4$bc	2.1 $x10^3$	2.7 $x10^4$	4.2 $x10^4$
A3	4.7 $x10^4$ a	3.1 $x10^3$	4.1 $x10^4$	6 $x10^4$
B1	3.3 $x10^4$ c	1.1 $x10^3$	2.9 $x10^4$	3.7 $x10^4$
B2	3.3 $x10^4$ c	4.4 $x10^3$	2.1 $x10^4$	5.1 $x10^4$
B3	4.4 $x10^4$ab	4.3 $x10^3$	3.6 $x10^4$	6.2 $x10^4$
LSD $_{0.05}$	9.3 $x10^3$			

Table (2) Statistical analytical results of APC in different regions of the carcass during summer season in hall 2.

Region	APC			
	Mean	SE	Mini.	Maxi.
A1	4.6 $x10^4$abc	9.9 $x10^3$	7.1 $x10^3$	7.1 $x10^4$
A2	5.7 $x10^4$ab	9.2 $x10^3$	2.1 $x10^4$	8.1 $x10^4$
A3	4 $x10^4$bc	2.7 $x10^3$	3.1 $x10^4$	5 $x10^4$
B1	6.4 $x10^4$ a	3.9 $x10^3$	5.1 $x10^4$	7.8 $x10^4$
B2	3.3 $x10^4$ c	4.6 $x10^3$	2.3 $x10^4$	5.2 $x10^4$
B3	6 $x10^4$ab	4.8 $x10^3$	4.2 $x10^4$	7.5 $x10^4$
LSD $_{0.05}$	1.8 $x10^4$			

Table (3): *Salmonella Typhimurium Isolates from carcass swabs in hall no. (1), (2).*

Total number	site	Hall	%
1	A_1	1	0.55
1	A_2	1	0.55
	A_3		
	B_1		
1	B_2	1	0.55
3	B_3	2	1.1
6			2.75%

Table (4): Antigenic structure of isolated *S. Typhimurium.*

Type	Somatic (o) antigen	Flagellar (H) antigen
S. typhimurium	1, 4, (5) , 12	*phase 1:1 *phase 2 :2

4. DISCUSSION

In summer, the statistical analysis proved that there were significant different between the mean values of region A_1 (posterior part of leg), A_2 (abdomen), A_3 (forearm), B_1 (posterior part of leg), B_2 (abdomen), and B_3 (forearm) While there is no significant different between the regions B_1, B_2. On the other hand, there was significant different between the region A_2, A_3, B_2 and B_3 at p value < 0.05. During autumn season in hall 1 and hall 2, there is no any significant different between the different examined regions of the carcass. In Winter season, there was significant different in hall 1 between the regions A_1, A_3, B_1, B_2, B_3, but there was non-significant different between each of A_2, A_3, B_1, B_2 and season in hall 2 there was a significant different between A_1, and A_3, B_1, B_2, B_3, while there was non-significant different between A_1, A2, A_3, B_1 and B_2. During spring season, in hall 1 there was no significant different between the examined carcass while in hall2 there was significant different between regions A_1, A_2, A_3, B_2 and B_3. A_1 region B_1 region had no significant different in the same time in the same hall.

Narasimha Rao and Ramesh (1992) mentioned that the APC in 86.6% of the carcass ranged between $1x10^2$ to $7.9x10^4$cfu /cm This agree with that reported in this study. (Okonko et al., 2010) had relatively similar Apc on fresh meat ranged between $2.62x10^4$ to $4.84x10^4$cfu /cm. The higher incidence of microbial food in fresh meat might be attributed to unhygienic and improper handling of animals during slaughter, dressing and evisceration. The usual practice of washing the carcass with the same water in which intestine and offal had been considered as the prominent reason for increase microbial count of carcass. It is agree with that reported by US Food and Drug Administration (USFDA) (2012). The Salmonella isolates from 180 carcass swabs in hall 1&2 were 5 in a total percentage 2.75%. In hall 1, one *Salmonella Typhimurium* in site 1 was isolated from each of site A_1 (posterior part of leg), A_2 (Abdomen) and B_2 (Abdomen) with a percentage of 0.55% for each site. On the other hand, from the site B_3 (forearm) of the carcass in hall 2. Two isolates from different carcass with a percentage 1.1%. In table (4) the salmonella typhimurium antigenic structure acc. To serological identification was somatic (O) antigen 1, 4, (5), 12 and flagellar (H) antigen phase 1:1, phase 2:2. Narasimha Rao and Ramesh (1992) failed to detect Salmonella spp. While Moehario et al. (2009) reported relatively higher results more than reported in this study in meat in Malaysia (7.7%). In Australian domestic meat plant is relatively lower percentage of Salmonella spp. in beef carcass (1.4%).

It is recommended to eliminate sources of contaminations from animal entering to the abattoir passing by procedures of slaughter till carcass dressing to produce high quality end products.

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