Assessment of Bacterial Contamination of Sheep Carcasses at Slaughterhouse in Khartoum State

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ARTICLE INFO	ABSTRACT
	The aim of this study was to assess the microbial contamination of sheep carcasses before and after wearing gloves, apron, mask and caps at slaughterhouse in Khartoum state. A total of 600 swab samples were collected from different operational points namely; skinning, evisceration and washing from the site of neck, shoulder, brisket and rump. The Total Viable Count (TVC) was used to assess bacterial these sites before and after treatment by wearing protective clothes. In addition 60 swab samples were taken from hands of workers and their knives also before and after sterilization by tap water at 82 °C. The results revealed that there was reduction in the bacterial counts according to the anatomical site of sampling at operational points with range of 2.39 ± 1.03 $\log_{10}$ cfu/ cm^2, 2.30 ± 1.11 $\log_{10}$ cfu/cm^2, 2.35 ± 0.98 $\log_{10}$ cfu/ cm^2 in the neck after treatment (p≤ 0.05). respectively The viable counts of the workers' hands reduced to 2.23 ± 0.99 $\log_{10}$ cfu/ cm^2, 2.12 ± 1.33 $\log_{10}$ cfu/ cm^2, 2.12 ± 1.01 $\log_{10}$ cfu/ cm^2 at different operational points (P<0.05). The presence of bacteria in the meat in the slaughterhouse indicated that unhygienic processing of meat

INTRODUCTION:

The meat of sheep is an important food to the human. Wholesome meat must be produced hygienically, free from pathogenic organisms and retains its natural state and nutritive value (Govindargan, 1990; Gill, 2004). Monitoring the prevalence of microorganisms of hygienic interest in primary production at abattoirs makes data avalable for effective control of pathogenic agents before they entered the food (Bhandare *et al.*, 2010). According to Kalalou and Ahami (2004) meat is an excellent source for growth of ersophilic and psychrophilic bacteria which cause the infection to human,

spoilage of meat and economic loss. The bacterial load at the surface of sheep carcasses is essentially to evaluate that to cope with the international standards (Elhassan *et al.*, 2011). The meat is source of contamination from slaughtering until the end of selling. Therefore, it becomes unsafe for human consumption (Koffe-Nevry *et al.*, 2011; Lawan *et al.*, 2011). The presence of various bacteria on meat is an indication of low standard levels of animals, the handling of meat from pre-slaughter to post-slaughter, abattoir facilities and sales of meat (Obeng *et al.*, 2013). Results of Arain *et al.* (2010) concluded that the fact of unhygienic and poor sanitary condition under which meat was handled and sold at local meat shops/stalls.

Contamination of sheep carcasses by evisceration process is reported by Gill and Baker (1998) and the microorganisms increased in the abattoirs compared by their post flying level. The results of Amine *et al.* (2013) revealed that after evisceration the bacterial count is high due to fecal contamination and the neck is most contaminated site. The main sources of contamination during the slaughter are slaughtered animals, the environment and the labors (Sheriden, 1998. The aim of this study was to assess the microbial contamination of sheep carcasses before and after treatment by wearing protective clothes.

Material and Methods

The study was conducted in a slaughterhouse located in Khartoum state. A total of 600 swab samples were collected from neck, shoulder, brisket and rump of 30 selected sheep carcasses before and after treatment (wearing of gloves, aprons, masks and caps) at skinning, evisceration and washing, respectively. Carcass sites were sampled by the swab technique (10 cm × 10 cm) for which sterile cotton swabs with 0.1% peptone water. Also 60 swab samples were taken from the workers' hands and their knives before and after sterilization by tap water at 82 °C between different operational points at processes.

Total Viable Count

For evaluation of the Total Viable Count (TVC) the standard pour plate technique was followed using 10^{-4} and 10^{-5} dilutions (Barrow and Fltham, 2003).

Statistical Analysis

All bacterial counts were converted to $\log_{10}$ (cfu/cm^{-2}) for analysis. ANOVA was performed. Statistical significance was set at P- value of ≤0.5.

Results

The mean total number of viable bacteria before treatment at operational points in the neck was 4.90±1.92. 5.03±1.62, 4.56±1.34 but after treatment TVC was reduced to 2.39±1.03, 2.30±1.11, 2.35±0.95, with statistical significance difference at P- value of ≤0.5. Also TVC in shoulder, brisket and rump (Table 1) increased before treatment and reduced after treatment.

Table 1: Total viable counts (Log$_{10}$ cfu/ cm^2) of sheep carcasses before (Control) and after treatment

Site	Operational points					
	Control			Treatment		
	Skinning	Evisceration	Washing	Skinning	Evisceration	Washing
Neck	4.90±	5.03±1.62	4.56±1.34	2.39±1.03[*]	2.30±1.11[*]	2.35±0.98[*]
Shoulder	4.74±1.63	4.88±1.49	4.64±1.43	2.55±0.95[*]	2.31±0.93[*]	2.14±0.91[*]
Brisket	4.90±	4.96±1.66	4.68±1.54	2.50±0.91[*]	2.01±1.01[*]	2.20±0.96[*]
Rump	4.80±1.62	5.16±1.62	4.41±1.39	2.62±1.01[*]	2.37±0.90[*]	2.04±0.84[*]

*= significant at level (P<0.05)

As shown in Table 2, there was significant reduction in TVC when measured from hands of workers and their knives after treatment in operational points (P ≤0.5).

Table 2: Total viable counts (Log$_{10}$ cfu/ cm^2) at hands of the workers and knives before (Control) and. after treatment

Site	Operational points					
	Control			Treatment		
	Skinning	Evisceration	Washing	Skinning	Evisceration	Washing
Hand	4.91±1.57	5.14±1.55	4.59±1.45	2.23±0.99[*]	2.12±1.33[*]	2.12±1.01[*]
Knives	4.85±1.48	4.75±1.90	ND	2.17±1.06[*]	2.17±1.14[*]	ND

*= significant at level (P<0.05), ND= not detected

DISSCUSSION:

The results recorded in the present study revealed that the bacterial counts (Table 1) were high in the four sites (neck, shoulder, brisket and rump) before treatment at skinning, evisceration and washing. These findings in agreement with the findings of Gill and Barker (1998) and Abdalla *et al*., (2009a) who reported that meat contaminated by bacteria during skinning operation. The contamination of meat at different parts showed significant statistical difference in the microbial count (Mboto *et al.*, 2012). The reduction of TVC after treatment in our study may be attributed to proper wearing and cleaning of the body before and after skinning resulting in the decreased level of contaminating bacteria (Aftab *et al.*, 2012). Also evisceration process has an important role in contamination of the muscles, because the feces is riched with coliform bacteria (Collobert *et al.*, 2002; El-Hadef *et al.*, 2005; Bhandare *et al.*, 2007).

Washing of the body reduced the level of organisms with complete wearing of protective clothes as shown in our study, whereas in another study of Ali (2007)

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and Abdalla *et al*. (2009b) recorded that post washing might increase the level.

In this study the bacterial count from workers' hands after treatment showed significant reduction (Table 2) compared with control and the washing of knives by warm water (82 °C) decreased the level of viable bacteria. These results are similar to the results of Abdalla *et al.* (2010).

The presence of bacteria in meat in the slaughterhouse indicated that unhygienic handling of meat. The decontamination processes are important to eliminate the sources of contamination and that by practicing an appropriate training for personnel, application of good hygienic methods.

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