

BACTERIOLOGICAL STATUS OF BUFFALO OFFALS BY USING DIFFERENT CONCENTRATIONS OF SODIUM HYPOCHLORITE

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ABSTRACT

This study revealed the influence of different concentrations of sodium hypochlorite solution on bacterial characters of buffalo offals which are head meat, heart and rumen using solutions 0.005, 0.01% and 0.015% of sodium hypochlorite. A total of 60 buffalo offals samples (15 samples of head meat, 15 of heart, 15 of rumen and 15 control) were collected from buffalo offals market in Kafr El-Sheikh city under complete aseptic condition in coalman to the laboratory and subjected to immersion treatments in different concentrations of sodium hypochlorite. Water washed offals (dist water) were used as control. The data obtained were subjected to statistical analysis, mean log 10 reductions achieved (CFU). Immersion of 0.015% sodium hypochloreite solution for 5 seconds gave the best overall reduction effect.

INTRODUCTION

Edible offals that are available from slaughtered animals are of great value. Efficient utilization of these edible products is essential to support on economical and viable meat production system. During slaughter and processing, all potentially edible tissues are subject to contamination from variety sources within and outside the animal (Ayres, 1955).

Edible offal from animals presents a heterogeneous collection of tissues. Thus, each kind of offal can be expected to exhibit some unique microbiological characteristics. In general, offal possess poor microbial quality due to the presence of readily available nutrients and poor hygienic conditions during their handling, collection and processing. No much work has been done on microbial quality of offals. However, several methods have been developed for bacterial reduction on different kind of carcasses which include trimming, water washing (*Hardin et al., 1995, Reagan et al., 1996*), hot water spraying (*Rheault and Quessy, 1999, Eggenberger-Solorzano et al., 2002 and Bosilevac et al., 2006*) and steam pasteurizing (*Phebus et al., 1997; Minihan et al., 2003*).

In addition, carry of chemicals such as short chain organic acids, polyphosphates, chlorinated compounds and disinfectants have also been used for this purpose. Some researchers tried various antimicrobial agents and found that efficient utilization of these agents resulted in the reduction of total viable count 10^3 and 10^4 cfu g⁻¹ in beef and pork liver, *Patterson and Gibbs (1979)*.

Among these chemicals, chlorine (especially hypochlorite) is the most commonly used antimicrobial agent in food processing due to its availability, relative cost and efficacy (*Tsai et al., 1992*). Various researchers have found that the use of chlorine interventions in the processing of carcasses or offals to be effective for reducing bacterial populations (*Sinhamahapatra et al., 2004*).

Hence these studies that the quality of offals is generally inferior and reduction of such contamination is of great importance from public health the present study was investigated to identify the optimum concentration of sodium used for the decontamination of buffalo-offals.

MATERIAL AND METHODS

Collection of buffalo offals samples:

Buffalo offals, head meat, heart, and rumen were collected from offal market of Kafr El-Sheikh city and were packed individually in clean polyethylene bags then they were brought in an insulated iced containers to laboratory the time log between slaughter of animal and commencement of treatment and analysis was about 3-4 h.

Treatment of buffalo offals with sodium hypochlorine solutions:

Heart was aseptically cutted into pieces each piece about 100 g. while head meat and rumen were cutted into other pieces. each piece about 250 g.

Four groups were formed, each group contain three pieces of each offal. 1st group act as control, 2nd, 3rd and 4th were treated with 0.005, 0.01 and 0.0155 (SHC) solution at ambient temperature for standardized contact times, respectively. The first group was washed with sterile saline and was maintained as a control. Then, the control and treated offal pieces were analyzed 45 min. after the treatments for various quality characteristics microbial and sensory.

Microbial quality:

Microbiological quality of control and treated offal pieces were determined based on total viable counts, coliform counts and staphylococcal counts. All microbial groups were assessed by pour plate method following the procedures of American public Health Association (*APHA, 1984*). Five grams from each offal piece was aseptically with 45 ml of 0.1% sterile peptone water in a blender. Decimal dilutions were prepared from the blended samples using sterile 0.1% peptone water for

the counts. 1 ml of each of the serially diluted homogenate was inoculated in duplicate plates contained appropriate growth media using pour plate method. Inoculated plate with count agar were incubated at $37 \pm 1^\circ\text{C}$ for 48 h, under aerobic conditions to assess the number of viable organisms per gram of sample. Enumeration of coliforms was carried out by (MPN) most probable number of coliforms incubated for 24 h aerobically. Staphylococci were enumerated on Baird Parker Agar incubated at $37 \pm 1^\circ\text{C}$ for 48 h under aerobic conditions.

RESULTS

Table (1): Log 10 mean of viable bacterial counts of head meat treatment with different concentrations SHC.

Sodium hypochlorite dilution	APC	Coliforms	<i>Staph. aureus</i>
Control	5.4	2.3	3.1
0.005%	3.3	2.53	2.38
0.10%	2.6	<2	2.3
0.015%	<2	<2	2.21

Table (2): Log 10 mean of viable bacterial counts of heart meat treated with different conc. SHC.

Sodium hypochlorite dilution	APC	Coliforms	<i>Staph. aureus</i>
Control	5.1	2.8	2.68
0.005%	3.1	2.4	2.5
0.10%	2.2	<2	2.6
0.015%	<2	<2	<2

Table (3): Log 10 mean of viable bacterial counts of rumen treated with different concentration of sodium hypochloride.

Sodium hypochlorite dilution	APC	Coliforms	<i>Staph. aureus</i>
Control	5.1	2.6	7.1
0.005%	2.06	<2	6.4
0.10%	2.03	<2	5.4
0.015%	<2	<2	4.3

DISCUSSION

(1) Effect of sodium hypochlorite on viable bacterial counts of head meat:

The initial bacterial loads of head meat were recorded in Table (1), where the mean log value of aerobic plate count, coliform count and *Staph. aureus* count were 5.4, 2.3, 3.1, respectively for control samples.

While, the aerobic plate count, coliforms count and *Staph. aureus* for 0.005% sodium hypochlorite treated sample were 3, 3, 2.53 and 2.38 respectively and for 0.01% were 2.6, < 2, 2.3 and for 0.015 were 2.10, > 2 and 2.21, respectively.

2. Effect of sodium hypochlorite on viable bacterial counts of heart meat:

The initial bacterial loads of heart meat were recorded in Table (2) showed that the mean log value of aerobic plate count coliform count and *Staph. aureus* count for control samples were 6.4, 2.8 and 2.68, respectively.

While the aerobic plate count, coliform count and *Staph. aureus* count were 3.1, 2.4 and 2.5 for 5.1% sodium hypochlorite. 2.2, < 2 and 2.6 for 0.01% treated sodium hypochlorite and 2.1, < 2 and 2.3 for 0.015% treated sodium hypochlorite, respectively.

3. Effect of sodium hypochlorite on viable bacterial counts of rumen:

The initial bacterial loads of rumen were recorded in Table (3) where the mean log value of aerobic plate count, coliform count (MPN) and *Staph. aureus* count were 5.4, 2.6, 7.1 for control samples respectively.

While the aerobic plate count and coliform (MPN) and *Staph. aureus* count were 2.06, < 2 and 6.6 for 0.005% sodium hypochlorite 2.03, < 2 and 5.47 for 0.01% treated sodium hypochlorite and < 2, < 2 and 4, 3 for 0.015% treated sodium hypochlorite, respectively. Nearly similar results obtained by *Selvan et al. (2007)*.

From the above results, it has been found that 0.015% SHC appears to be more effective in APC and *Staph.* count when compared to 0.005 and 0.01% for all kind of buffalo offals studied. The results of present study are related to the work done by who observed that spraying of exterior surfaces of beef plates with 100, 150 or 200 ppm hypochlorite solution for 12 sec. resulted in less than one log reduction in initial aerobic bacterial counts and one log or greater reduction in coliforms count. Similarly, also found that the spraying of water washed pork carcasses with 200 ppm of sodim hypochlorite solution for 30 sec resulted in the reduction of total viable cont from 2.50 to 2.21 cfu cm². Present results indicate that sodium hypochlorite solutions were relatively ineffective against staphylococcal organisms. Correspondingly *Mead and Adams (1988)* found the presence of chlorine resistant strains of *Staphylococcal aureus* in poultry processing plants and Turkey products respectively.

CONCLUSIONS

Those from this study is can be concluded that immersion in 0.015% sodium hypochlorite solution for 5 sec. is proved to be effective for lowering the bacterial load of buffalo offals.

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الحالة البكتريولوجية لأحشاء الجاموس باستخدام تركيزات مختلفة

من محلول هيبوكلورات الصوديوم

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أجريت هذه الدراسة لبحث إمكانية استخدام تركيزات مختلفة من محلول هيبوكلورات الصوديوم لتخفيض المحتوى البكتيرى لبعض الأحشاء الداخلية للجاموس المذبوح.

تم تقسيم بعض الأحشاء الداخلية للجاموس المذبوح إلي أربعة مجاميع حيث اعتبرت المجموعة الأولى مجموع ضابطة ثم غمر الجزء الباقى من العينات فى تركيزات مختلفة من محلول هيبوكلورات الصوديوم 0.005 ، 0.01 ، 0.015 وقد أسفرت نتائج فحص العينات ان غمر بعض الأحشاء الداخلية من محلول هيبوكلورات الصوديوم تركيز 0.015 لمدة خمس ثوانى قد أدى الى تخفيض العدد البكتيرى لبعض أنواع الميكروبات المبيئة مثل العدد البكتيرى الكلى والميكروب القولونى.

لذى ينصح بغمر بعض الأحشاء الداخلية فى محلول هيبوكلورات الصوديوم لمدة خمس ثوانى لتخفيض العدد البكتيرى بها.