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Analysis of Cow Meat Sold at Nkwo Market of Okija; Health Implication

Osuji M I[1], Udeogu CV[2]. Unegbu VN[2], Odili MC[3] Okafor MO[3]

[1]*Department of Microbiology Federal University of Technology Owerri Imo State Nigeria.*

[2]*Department of Biological Science, University of Agriculture and Environmental Science Umuagwo Imo State*

[3]*Department of Microbiology, Legacy University Okija Anambra State*

***Corresponding author:** *Osuji Malachy Ikeokwu, Department of Microbiology Federal University of Technology Owerri Imo State Nigeria.*

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Abstract:

This research was done to analyze and ascertain the bacterial load of cow meat sold in Nkwo Market of Okija. This will be able to reveal the health significance and implication of the beef. The beef and waste water the sellers use in washing it were aseptically collected. Ten sold serial dilution was done and spread plate technique adopted. After incubation; bacterial load range of 1.2x105 to 6.0x105, 0.1x104 to 0.4x104 and 1x104 to 6x104 (cfu/g/ml) for total heterotrophic, coliform and SS count respectively were obtained for the wastewater. For the beef, 5x105 to 6x105, 0.1x104 to 0.9x104 and 0.3x104 to 0.6x104 (cfu/g/ml) for total heterotrophic, coliform and SS count were obtained. *E.coli, Salmonella, Shigella, Bacillus* and *Clostridim* species were isolated. Poor environmental condition and unhygienic practice were responsible for the containment. Clean-up exercise and cooperation of health workers were recommended to reduce containment. Finally, raw beef bought from the sellers should be boiled very well and if possible roasted to ensure safe and wholesome beef consumption.

Keywords: *Heterotrophic; Coliform; Dilution; Incubation; Isolation; Consumption*

Introduction

Meat from cow is rich proteins food and which is widely taken by people. It is a very delicate product which is susceptible to microbial invasion and subsequent deterioration. However, raw retail meats have been identified as potential vehicles for transmitting food-borne diseases, and hence the need for increased implementation of Hazard Analysis of Critical Control Point (HACCP) and consumer food safety education efforts. Bacterial food poisoning is widely spread and occurs when our environments are untidy and the foods are not hygienically maintained. [1] have shown that food items especially meat, are not only of high nutritional value to those who consume them but often are ideal culture media for microbial growth. Meat is one of the most perishable foods, and its

composition is ideal for the growth of a wide range of spoilage bacteria [2]. Fresh meats are sometimes contaminated with bacteria, which can be harmful to the human body. The major bacterial pathogens include: *Bacillus cereus, Staphylococcus aureus, Clostridium botulinum, Clostridium perfringens, Coliforms, Bacillus cereus* and *Escherichia coli*. The sources of these microbes in meat could be inherent micro-flora in normal tissues of animals, air, environment, or contamination due to unhygienic slaughtering, handling and processing conditions. At each stage of beef processing after slaughtering, different microbes get introduced and these tend to contaminate the meat. The microbes cause biochemical and microbiological changes in the meat which may lead to the production of noxious substances resulting in the incidence of illnesses such as cholera, typhoid fever and other fatal diseases. Besides the chemical composition, meat culinary and technological value is determined by it's umber of meat borne infections and intoxications in several countries [3].

Materials and Methods

Materials Used

The materials and reagents used in this research work include: test tube, conical flask, petri dish, aluminium foil, incubator, wire loop, alcohol, Bunsen burner, masking tape, colony counter, capped test tube.

Description of Study Area

Okija is a town in Ihiala Local Government Area of Anambra State of Nigeria. It is a strategic and popular town as it hosts two Universities Legacy and Madonna. The Nkwo market is a big market that holds daily.

Study Design

This research was designed to analyse the beef sold in the market. This was also designed to check the health implication of consuming unwholesome beef from the market. The beef and the wastewater the meat seller use in washing are to be analysed.

Sample Collection

A total of five (5) different lumps (200g) of beef were bought from the male sellers using sterilized transparent nylon bag (the ones used in wrapping bread). Also five (5) different sterilized capped test tubes were used for wastewater collection. The collected samples were all sent to Microbiology Laboratory of Legacy University Okija within 2hours of collection.

Bacteriological Analysis of The Raw Beef and Wastewater

Enumeration of total heterotrophic and coliform count

A sterile scissor was used to cut 1g each of the five (5) different beef and soaked in 10ml of sterilised distilled water. The soaked meat was allowed to stay in the distilled water for two (2) hours. This is to allow the water to permeate the tissue/cell of the beef. For the wastewater, one (1ml) millilitre each was taken from the five capped test tubes and added to 9ml of sterile distilled water. These preparations will serve as stock culture.

Enumeration of Total Heterotrophic Count

According to Gugu et al (2015), the stock culture was used to perform ten (10) fold serial dilution. A 0.1ml of 10-3 and 10-4 diluents were spread plated out on nutrient agar (NA) in duplicates. The plates were incubated at 37^{o}C for 24hrs. Growths were observed, counted and recorded.

Enumeration of total coliform count

A 0.1 ml from 10-2 and 10-3 diluents were spread plated out on MaConkey agar (MAC) in duplicates. This was according to the method described by [6]. The plates were incubated at 37°C for 24Hrs. Growths of colonies were observed, counted and recorded [7].

Enumeration of Total *Salmonella/Shigella* Count

A 0.1 ml from 10-2 and 10-3 diluents were spread plated out on *Salmonella-Shigella agar* (SSA) in duplicates. This was according to the method described by [4]. The plates were incubated at 37*o*C for 24Hrs. Growths of colonies were observed, counted and recorded.

Purification of Isolates

The colonies were isolated using streaking method. They were stored in agar slants for identification. Colonies were isolated and identified based on morphology and colour.

Biochemical tests and identification of isolates

According to the method detailed by, the following biochemical tests were conducted.

i. Catalase test

ii. Oxidase test

iii. Methyl Red test

iv. Indole test

v. Voges-Proskauer test and (Cheesbough, 2003)

Results

The results of the mean total heterotrophic, coliform and *Salmonella/Shigella* counts were shown in Tables 1.1 and 1.2 in Cfu/g and Cfu/ml respectively.

Discussion and Recommendation

The safety of food against food-borne disease must be taken serious. According to, international microbiological standard limit for bacterial plate count is 1.0 x 105 cfu/g. bacteria like *E.coli* and *Samonella* are important health problem and they pose serious challenge to people.

The bacterial load of beef and pork both fresh and roasted in a research conducted by are high due to poor handling. In this research, the bacterial load of *Salmonella* and *E.coli* are very high. This correspond to the work done. The total heterotrophic count and SS count of 6 x 105 cfu/g and 6.0 x 104 cfu/g as shown in tables 1.1 and 1.2 revealed that the beef sold in Nkwo market are not free from bacteria.

Reason for Contamination

The research team traced the source of the beef to the abattoir and discovered the following as responsible for the contamination.

1. Most cow killed are not healthy
2. The environment condition in that place is not encouraging.
3. There is no good source of water in that place
4. Most of the meat were kept on the bare ground.
5. Stagnant water was seen in the place

Recommendation

This research after serious considerations recommend the following to help reduce contamination of the meat.

1. Health officers should check the cow before they are slaughtered.
2. There should be adequate provision of clean water at the slaughter house.
3. There should be proper sensitization on the safety rules to the slaughter boys.
4. General clean up exercise should be

conducted there regularly.

Conflict of interest

There is no conflict of interest in this research work.

Acknowledgement

The authors sincerely express their gratitude to the journal for the publication of this work.

Sample	Total Count	Heterotrophic	Total Coliform count	Total SS count
1	5 x 105		0.7 x 104	0.4 x 104
2	8 x 105		0.8 x 104	0.5 x 104
3	4 x 105		0.9 x 104	0.5 x 104
4	4 x 105		0.10 x 104	0.3 x 104
5	6 x 105		0.8 x 104	0.6 x 104

Table 1.1: Mean of plate count for the beef Cfu/g).

Sample	Total Heterotrophic count	Total Coliform count	Total SS count
1	2.0 x 105	0.4 x 104	1 x 104
2	1.5 x 105	0.1 x 104	3 x 104
3	1.2 x 105	0.1 x 104	5 x 104
4	2.2 x 105	0.2 x 104	3 x 104
5	6.0 x 105	0.3 x 104	6 x 104

Table 1.2: Mean of plate count for the wastewater (Cfu/ml).

Isolate	Gram staining	Catalase test	Methyl Red	Indole test	Voges-Proskauer test	organism
A	-	+	+	+	-	E.coli
B	-	+	+	-	+	Salmonella
C	-	+	+	varies	-	Shigella
D	+	+	-	-	+	Bacillus
E	+	-	+	-	+	Clostridium

Table 1.3: Organism Count

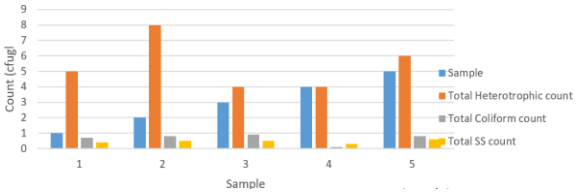

Figure 1: Mean for plate count for the beaf (cfu/g).

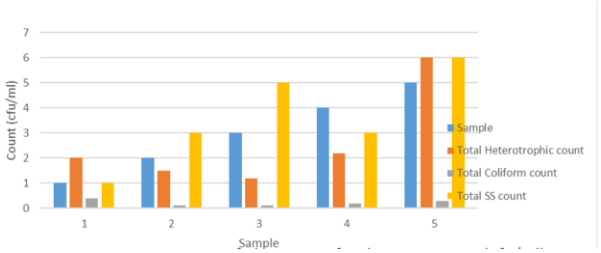

Figure 2: Mean for plate count for the waste water (cfu/ml).

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