

HEAVY METAL CONTAMINATION OF SINGED CATTLE HIDES IN NSUKKA
ABATTOIR, ENUGU STATE, NIGERIA.

BY

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CERTIFICATION

I certify that Ekenma Kalu (PG/M.Sc/09/50967) carried out this research work in the Department of Veterinary Public Health and Preventive Medicine at University of Nigeria Nsukka.

The work presented here is original and has not been previously reported anywhere else.

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DEDICATION

I hereby dedicate this project to my loving parents, Prof. and Mrs. A.U. Kalu.

ACKNOWLEDGEMENT

My sincere gratitude goes to GOD Almighty, the alpha and omega of my life. The reason I am alive.

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TABLE OF CONTENTS

Title page	-----	i
Certification	-----	ii
Dedication	-----	iii
Acknowledgement	-----	iv
Table of contents	-----	v
List of tables	-----	xi
List of figures	-----	xii
Abstract	-----	xiii
CHAPTER ONE		
1.0	Introduction -----	1
1.1	Background of study -----	1
1.2	Statement of the problem -----	3
1.3	Objectives of the study -----	5
1.4	Significance of the study -----	6
1.5	Scope of the study -----	6
1.6	Research questions -----	7

1.7	Research hypotheses	-----	7
CHAPTER TWO			
2.0	Literature review	-----	8
2.1	Background of information	-----	8
2.2	Abattoir operations	-----	10
2.3	Slaughter and processing of cattle in abattoir	-----	11
2.4	Singeing in abattoir	-----	12
2.5	Meat handling and the abattoir environment	-----	13
2.5.1	Environmental implication of unhygienic conditions in abattoir	-----	13
2.5.2	Sanitary conditions in abattoir	-----	14
2.6	Sources of heavy metals	-----	15
2.6.1	Heavy Metal contamination of meat and health risk	-----	17
2.7	Metabolic effects of heavy metals	-----	22
2.8	Heavy metal contamination in aquatic organisms	-----	23
2.9	The role of abattoir in investigation and control of diseases	-----	24

CHAPTER THREE

3.0	Materials and methods	25
3.1	Study area	25
3.2	Study design	26
3.3	Experiment 1: Heavy metals investigation in hides	26
3.3.1	Sample sites and sampling methods	26
3.3.1.1	Abattoir	26
3.3.2	Instruments for sample collection	27
3.4	Laboratory analyses	28
3.4.1	Sample analysis for hides	28
3.4.2	Statistical analysis for hides	29
3.5	Experiment 2 (Bioassay): BSLT using singed effluent	
	from hides to determine C_{50}	30
3.5.1	Sample collection	30
3.5.2	Sample analysis for abattoir waste water effluent	30
3.5.3	Determination of concentration of heavy metals	
	in waste water effluent	31

3.5.4	Brine shrimp lethality test	-----	31
3.6	Statistical analysis for BSLT	-----	32
CHAPTER FOUR			
4.0	Results	-----	33
4.1	Heavy metal pollution in Nsukka slaughter house	-----	33
4.2	Mean concentration of heavy metals in Nsukka slaughter house	-----	35
4.2.1	Unsinged hides	-----	35
4.2.2	Singed hides	-----	35
4.2.3	Singed and washed hides	-----	35
4.3	Percentage increase in heavy metal concentration in hides when compared to MPL	-----	37
4.4	Comparison of mean concentration of metals in current study with previous studies	-----	39
4.5	Percentages increase in heavy metal concentration in singed hides relative to unsinged hides in Nsukka slaughter house	-----	41
4.5.1	Unsinged hides (USH) and Singed hide (SH)	-----	41

4.5.2	Singed hides (SH) and processed hides (SWH) in Nsukka slaughter house. -----	43
4.5.3	Percentage decrease in mean concentration of heavy metals in unsinged hides (USH) and Singed and washed hides (SWH) -----	45
4.6	Ranges of heavy metals in the various hides in Nsukka slaughter house	47
4.6.1	Unsinged hides (USH) -----	47
4.6.2	Singed hides (SH) -----	47
4.6.3	Singed and washed hides (SWH) -----	48
4.7	Correlation between heavy metals in USH and SWH hides in Nsukka in slaughter house. -----	50
4.8	Water analysis -----	52
4.9	BSLT -----	53
4.9.1	Determination of the concentration of water effluent -----	54

CHAPTER FIVE

5.0	Discussion -----	61
5.1	Conclusion and recommendations -----	69

REFERENCES ----- 71

APPENDIX 1 ----- 85

LIST OF TABLES

Table 1:	Mean concentrations of heavy metals in cattle hides in Nsukka Slaughter house.	34
Table 2:	Percentage of heavy metal concentrations in relation to MPL -----	38
Table 3:	Comparison of mean concentration of metals in the current study and previous studies -----	40
Table 4:	Percentage increase in heavy metal concentrations in singed hides relative to unsinged hides (control) in Nsukka slaughter house.	42
Table 5:	Percentage decrease in heavy metal concentration in processed hides in Nsukka slaughter house -----	44
Table 6:	Percentage decrease in mean concentration of heavy metals in Singed - washed hides relative to unsinged hides in Nsukka slaughter house -----	46
Table 7:	Range of values of concentration of heavy metals in different hides in Nsukka slaughter house -----	49
Table 8:	Correlation between heavy metals in USH and SWH of hides in Nsukka slaughter house -----	51

Table 9:	Mean concentration of metals in water washing of cattle hides	
	in Nsukka slaughter house -----	52
Table 10:	Brine Shrimp Lethality Test of the Effluent -----	53

LIST OF FIGURES

Fig. 1:	Effects of various methods of processing of cattle hides on the level of heavy metal concentrations in Nsukka slaughter house -----	36
Fig. 2:	Pieces of plastics and used feed bags for fueling wood in Nsukka slaughter house -----	55
Fig. 3:	Tyre used as a source of fuel to singe hide in Nsukka slaughter house	56
Fig 4:	Cattle hides placed directly on metal stripes during singeing in slaughter house -----	57
Fig 5:	Polythene and pieces of plastic used to fuel wood for singeing in slaughter house -----	58
Fig 6:	Metal rods and scrap used to singe hides in Nsukka slaughter house -----	59
Fig 7:	Singeing operation of cattle hide with metal rods and stripes slaughter house -----	60

ABSTRACT

This research was carried out to investigate the possible heavy metal contamination of hides due to the various methods of singeing. A total of 60 cattle were used to carry out this study. Hides of cattle that were unsinged and singed were analysed for lead (Pb), cadmium (Cd), nickel (Ni), copper (Cu) and iron (Fe) using buck scientific atomic absorption spectrophotometer (AAS) model 210 VGP. AAS was also used to determine the concentration of heavy metals in abattoir waste water effluent. Bioassay was carried out on brine shrimp (*Artemia salina*) for 48 hours by exposing them to waste water effluent from washing of singed hides. There was substantial high level of these heavy metals in the unsinged cattle hide. The mean concentrations of heavy metals in unsinged hides were 5.65 ± 0.70 , 1.93 ± 0.39 , 9.88 ± 1.11 , 10.45 ± 1.20 and 1.95 ± 0.12 for Pb, Cd, Fe, Cu, and Ni respectively. These values were above the maximum permissible level (MPL) of 0.01 for Pb, 0.05 for both Cd and Ni, 0.1 for Fe and but below MPL of 20 mg/kg for Cu set for heavy metals in food animals. There was noticeable increase in the concentration of Fe, Cu and Ni upon singeing by 54.25%, 9.57% and 26.14% respectively. The values increased from 9.88 ± 1.11 in USH to 21.60 ± 3.52 in SH ($P = 0.001$) and 1.95 ± 0.10 in USH to 2.64 ± 0.21 in SH ($P = 0.007$) respectively. Copper also increased by 9.57% from 10.45 ± 1.20 in USH to 12.77 ± 1.06 in SH ($P = 0.127$) but was not statistically significant. Singeing reduced the level of Pb by 22.83% from 5.65 ± 0.70 in USH to 4.36 ± 0.79 in SH ($P = 0.353$) which was not statistically significant. The value gotten in the singed hides was also above the MPL. The sequence of decrease was thus $Cd > Fe > Cu > Ni > Pb$. The mean concentration of Cd was also decreased by 23.32% from 1.93 ± 0.39 in USH to 1.48 ± 0.28 in SH ($P = 0.068$). This was also not statistically significant. The reduction in the values of Fe by 61.7% from 21.60 ± 3.52 in SH to 8.27 ± 0.66 in SWH ($p = 0.007$) and Cu by 52.4% from 12.77 ± 1.06 in SH to 6.08 ± 0.56 in

SWH ($p = 0.002$) was statistically significant, while the reduction in the mean concentration of Pb by 4.8% from 4.36 ± 0.79 in SH to 4.15 ± 0.35 in SWH was not significant ($p = 0.87$). The mean concentration of Cd reduced by 69.6% from 1.48 ± 0.28 in SH to 0.45 ± 0.07 in SWH ($p = 0.105$); this reduction was not statistically significant. For Ni, the mean concentration reduced by 15.2% from 2.64 ± 0.21 in SH to 2.24 ± 0.23 in SWH ($p = 0.258$) and this reduction was not statistically significant.

Statistical analysis revealed positive correlation between nickel, cadmium, copper and lead in USH while singed treatment of hides produced a positive correlation between copper, nickel and iron. The results of the effect of brine shrimp lethality test of waste water showed that the LC_{50} was 7316 ppm at 95% confidence interval. Finney Probit analysis using SPSS gave LC_{50} of 7316 ± 2.32 ppm.

The results of this study proved that the environment and singeing processes may be responsible for the heavy metal contamination of hides in Nsukka abattoir. It also proved that the waste water from washed hides is toxic.

