ISSN : 0974 - 7427 Volume 6 Issue 7

Trade Science Inc.

BIOCHEMISTRY
An Indian Journal

Short Communication

BCAIJ, 6(7), 2012 [243-245]

Heavy metal contents assessment of cowhide singed with firewood (Bamboo)

Chike S.Okafor[1]*, Chukwuemeka E.Okeke[1], Patrick E.Omuku[2], N.C.Okafor[3]

[1]Dept. of Applied Biochemistry, Nnamdi Azikiwe University, Awka, (NIGERIA)

[2]Dept. of Pure and Industrial Chemistry, Nnamdi Azikiwe University, Awka, (NIGERIA)

[3]Dept. of Medical Laboratory Technology, Nnamdi Azikiwe University, Awka, (NIGERIA)

E-mail : chikeoka@yahoo.com

ABSTRACT

The concentrations of zinc (Zn), lead (Pb), and copper (Cu) were determined in various samples of cowhide. Butchers in Nigeria have been using firewood (bamboo) to singe cowhide and very few make use of traditional means of immersion in hot water to remove the furs of cowhide. This study analyzed such methods for the risk of heavy metal contamination and to know the best way to practice singeing of cowhides. The various samples of cowhides processed with firewood and hot water were analysed for heavy metal contents using an atomic absorption spectrophotometer (FS 240 Varian, USA). The result of the study showed a significant increase ($p<0.05$) in some heavy metal concentrations (Zn, Pb, Cu) in cowhides singed with firewood compared to the traditional means of immersion in hot water. Although, the singed cowhide was observed to show a significant decrease in heavy metals after washing with water, not all the heavy metals are washed out with water. This study indicates that singeing with firewood (bamboo) can increase some of the metallic contents of cowhide. Thus, the singeing of cowhides with firewood should be discouraged as they might pose a health hazard to the consumers of such cowhide. Processing cowhide with hot distilled water is a better alternative.

© 2012 Trade Science Inc. - INDIA

KEYWORDS

Cowhide;
Firewood;
Hot water;
Heavy metals;
Nigeria.

INTRODUCTION

Nigeria, with an estimated population of 160 million is the most is the most populous country in Africa. Hides of cow meat popularly called "ponmo"(in local parlance) are served as food delicacy and source of protein. The risk of heavy metal contamination in meat as a result of improper tools for singeing is of great concern for both food safety and health because of toxic nature of these metals at relatively minute concentration[1]. So many researches have many views on the effect of various fuel source used in singeing. Hides singed with firewood and spent engine oil may contain certain compounds like polyaromatic hydrocarbons, dioxins, furans, benzene and lead[2]. In this case, continuous consumption of such potentially contaminated

Short Communication

meat posses a great source of health risk[3].

Heavy metals are the metals found in the gap between group 2 and 3 in the periodic table. They can as well be referred to as transition metals. They contain the s, p, and d electrons and are therefore said to form the "d-block"[4].

Exposure to heavy metals has been linked with development retardation, various cancer, kidney damage and even death. However, some of them have some important uses for example zinc (Zn) and copper (Cu) are essential components in maintaining normal metabolism of human body (i.e. they act as a co-factors). They can be poisonous at high concentration.

The aim of this study is to compare the quality of cowhide (ponmo) singed with firewood against the method of immersion in hot water.

EXPERIMENTAL

Sample procurement

The samples used for this study were:

I. Unsinged cowhide.

II. Washed firewood singed cowhide.

The fire wood used for the singeing was from bamboo plant, purchased from Kwata market, Awka, Nigeria. The first three samples were purchased from Kwata abattoir in Awka, Awka South L.G.A. The cowhide samples were purchased from Marine abattoir in Onitsha, Anambra state, Nigeria. Prof. R. N. Okigbo of Botany Department, Nnamdi Azikiwe University Awka, Anambra state, Nigeria identified the bamboo plant.

Reagents

All the reagents used were of analytical grade

Sample preparation

The cow used was killed, portion of the hide was cut out and was processed using hot water. This served as the control. Other portions of the hide were singed differently using firewood. Part of the singed hide was washed with distilled water while the other part was not washed. The samples were dried in an oven at 100°C (09108NF, United State).

Heavy metal contents determination

The method of[5] was used for the heavy metal (Zn,Cu,Pb) contents determination.

Statistical analysis

Results of the study were expressed as mean± standard deviation. Differences between treated means were analysed using ANOVA of SPSS 16.0 spread sheet statistical package[6].

RESULTS

The mean concentrations and standard deviations of the metals determined in the cowhides are presented in TABLE 1.TABLE 2 shows the percentage increase in heavy metal concentrations relative to the control.

TABLE 1 : Mean concentration of heavy metals in both the control and firewood singed cowhides

METALS	CC	UFC	WFC	MPL
Zn (ppm)	55.880 ± 0.429	75.791 ± 0.107	68.485 ± 0.273	50.000
Cu (ppm)	0.101 ± 0.001	0.280 ± 0.001	0.166 ± 0.001	20.000
Pb (ppm)	0.040 ± 0.014	0.140 ±0.001	0.130 ± 0.010	0.100

Means are for triplicate determinations

Legend: CC (control) – cowhide processed with hot distilled water; UFC – unwashed firewood singed cowhide; WFC – washed firewood singed cowhide; MPL = Maximum Permissible Limit

TABLE 2 : Percentage increase in heavy metal concentration relative to the control

Metals	UFC	WFC
Zn (%)	36	23
Cu (%)	177	64
Pb (%)	250	225

DISCUSSION

The results of the analysis showed that there were significant increases ($p<0.05$) in the zinc, lead and copper levels of the cowhide singed with firewood compared to the control. Results also showed that washing the cowhide after singeing with fire wood significantly reduced the levels of copper and zinc in the cowhide. But washing did not significantly reduce the level of lead in the cowhide. Also except for copper the contents of the other heavy metals were above the maximum permissible limit. Hides singed with firewood and spent engine oil may contain certain compounds like polyaromatic hydrocarbons, dioxins, furans, benzene and lead[2].

However, excessive accumulation of zinc at high concentration can depress the immune system, cause anaemia, copper deficiency, and decrease high density lipoprotein cholesterol in the blood[7]. It has also been shown to damage nerve receptors in the nose which can cause anosmia.

Lead is a highly poisonous metal affecting almost every organ and system in the body, mostly the nervous system[8]. Lead has been shown many times to permanently reduce the cognitive capacity of children at extremely low levels of exposure[9].

CONCLUSION

Cow hides processed with firewood can contain toxic levels of heavy metals especially zinc and lead. Processing of cow hides by burning with firewood can pose tremendous health risk to the consumers of the cowhide.

The traditional method of processing cow hides using hot water seemed a better alternative. Finally, this study underscores an urgent need for regulatory agencies to regulate and supervise the activities of local butchers in Nigeria to conform to best practices necessary for abattoir operations.

ACKNOWLEDGEMENT

We acknowledge Mr. Okeke O. David of Springboard Laboratories, Awka, Nigeria for his technical assistance.

REFERENCES

[1] D.Sanhtri, A.Balakrishan, K.T.Radhakrishan; Presence of heavy metals in pork products in chemical. Ann.J.food Technol., **3(3)**, 192-199 **(2008)**.

[2] ATSDR: Agency for toxic substances and diseases registry. Toxicology profile for styrene, lead, mercury, zinc, copper. Draft public document. Division of toxicology and environmental medicine, Atlanta, GA, **(2007)**.

[3] S.Jayasekara, U.Samarajeewa, A.N.Jayakody; Trace metals in foods of animal in Srilanka. ASEAN Food J., 7, 105-107 **(1992)**.

[4] Y.A.Osei; New school chemistry. 5th Edition, 48 **(2005)**.

[5] D.Pearson; Chemical analysis of food. 7th Edition. New York; Churchill Livingstone, 75 **(1976)**.

[6] D.B.Duncan; Multiple range and multiple F- test. Biometrics, **11**, 1-42 **(1955)**.

[7] M.R.Black, D.M.Mederos, E.Brunette, R.Welke; Zinc supplements and serums lipids in young adult males. Am.J.Chin.Nutr., **47**, 970-975 **(1988)**.

[8] D.Rehder; Chemistry in space, 104 **(2011)**.

[9] M.S.Golub (Ed); Metals, fertility and reproductive. Boca Raton, Fla Taylor and Francis, 153 **(2005)**.