Cadmium, Lead And Chromium Traces In Liver, Intestine And Kidney Of Scavenging Swine And Dogs Slaughtered In Wukari Metropolis Of Taraba State, Nigeria.

Obun, C.O., Omotosho, O. B.,Ubua J.A*. and Tijjani, B. M

Department of Animal Production and Health, Faculty of Agriculture and Life Sciences, Federal University Wukari, Taraba State
* *Department of Animal Science, Taraba State University Jalingo*
Corresponding Author: obunotu@yahoo.com

Abstract
The aim of this study was to determine the concentrations of cadmium, chromium and lead) traces in the intestine, kidney and liver of scavenging swine and dogs slaughtered in Wukari metropolis of Taraba State. Samples of liver, intestine and kidney of swine and dogs were collected in slaughtered spots in Wukari metropolis. The collected samples of liver, intestine and kidney were digested and analyzed for cadmium, chromium and lead using flame atomic absorption spectrophotometer (AAS). The concentrations of these metals in the liver, kidney and intestine of pigs and dogs ranged from 0.03 to 0.03mg/kg for cadmium; 0.05 to 0.11 mg/kg for chromium and 0.14 to 0.23 mg/kg for lead. The highest concentration of lead was observed in the intestine of swine. The organs of dogs were less accumulated with heavy metals compared to swine. The results indicated that there was no significant (P>0.05) effect of heavy metal residues in organ of swine and dogs to heath risk for residents of Wukari metropolis.
.**Keywords:** Heavy metals, organs, swine, dogs.

Introduction
Heavy metals are ever present and the enter the environment by natural means or human activities through sources like natural weathering, mining, soil erosion, industrial effluents, agro chemicals and many other means (Morais *et al.*,2012). Exposure to heavy metal is very dangerous to both animal and human health. Toxic effects usually associated with chronic exposure are mutagenecity, carcinogenicity, Immune-suppression; poor body condition and impaired reproduction (Bayersmann.and Hartwig, 2008; Garcia-Leston *et al.,* 2010). By nature animals' liver, lungs and intestine are sources of metals like iron, copper, magnesium and zinc. However liver might contain higher amount of heavy metals and other contaminants which tend to accumulate in tissues (Adei and Forson-daboh., 2008), and affects performance and meat quality of these animals. Also some of these metals bio-accumulate in the food chain causing environmental and human health concerns (Sedki *et al*., 2003). As a result, human exposure to toxic metals has become a major health risk. Monitoring levels of trace elements and heavy metals in the different organs of animals meant for human consumption, allows assessing the quality and nutritive value for this purpose. Hence, this study was therefore designed to investigate contamination of some heavy metal residues in liver, intestine and kidney of slaughtered free ranged swine and dogs.

MATERIALS AND METHODS
Study Area
The study was conducted in Wukari metropolis of Wukari Local Government Area, Taraba State. Wukari is located between latitude 7º5N to 7º85'N and longitude 9º46'E to 9º78'E of the Greenwich meridian (TSD, 2008)

Collection of Samples
A total of 48 visceral organs (kidney, liver and intestine) from scavenging slaughtered swine (n=24) and dogs (n=24) were collected from various slaughter locations in Wukari metropolis. The organs were cleaned of dirt, oven-dried at 60^0C for 24 hr and packed in airtight containers before analysis.

Sample digestion and analysis

The samples (liver, kidney and intestine) of swine and dogs were digested in HNO_3 (16 mol/L) and H_2O_2 (30%) as described by Jeffrey (2003) at the Department of Animal Science Biochemistry Laboratory, ABU, Zaria. The concentrations of lead, cadmium, mercury and chromium was determined using flame atomic absorption spectrophotometer (AAS, Model 3030, Perkin-Elmer, USA) at the Department of Soil Science Laboratory, ABU, Zaria .

Data Analysis

Data generated from the laboratory analysis were subjected to student t-test to test for significant differences of heavy metal concentrations between the visceral organs of scavenging swine and dogs using JMP® SAS (2012).

RESULTS

The results in Table 1 show the concentration of cadmium, chromium and lead in the intestine of swine and dogs. The results revealed that cadmium and chromium concentrations are similar (P>0.05) in swine and dogs. The concentration of lead in swine is higher (0.23 mg/kg) compared with value of 0.10mg/kg in dog intestine.

Table 1: Concentrations (mg/kg, dry weight) of Cadmium, chromium and lead in intestine of swine and dogs.

Parameters	pigs	Dogs	p-value
Cadmium	0.02	0.02	0.01
Chromium	0.11	0.05	0.01
Lead	0.23	0.10	0.01

p-value for t-test comparing the heavy metal residues in swine and dog

The results in Table 2 present the concentrations of cadmium, lead and chromium in the liver of swine and dogs. The result shows higher numerical concentration of chromium (0.11mg/kg) and lead (0.19mg/kg in swine compared with those obtained in dogs.

Table 2: Concentration (mg/kg, dry weight) of cadmium, chromium, lead and mercury in liver of swine and dog.

Parameters	Swine	Dog	p-value
Cadmium	0.03	0.01	0.03
Chromium	0.11	0.09	0.01
Lead	0.19	0.05	0.01

p-value for t-test comparing the heavy metal residues in swine and dog

The results in Table 3 revealed that chromium (0.13mg/kg) and lead (0.14mg/kg) in swine were higher (P>0.05) compared with those in dog with exception of Cadmium.

Table 3: Concentration (mg/kg, dry weight) of cadmium, chromium and lead in kidney of swine and dogs.

Parameters	Swine	Dog	p-value
Cadmium	0.02	0.02	0.01
Chromium	0.13	0.10	0.02
Lead	0.14	0.10	0.01

P-value for t-test comparing the heavy metal residues in swine and dog

Discussion

The low Pb concentrations in the liver, intestine and kidney in this study for dogs compared with higher values (0.09-0.23mg/kg) in swine could be due to high scavenging activities in contaminated feed, water source and the environment. Pb values range of 0.09-0.23mg/kg in this study is less than the maximum level of 0.5 mg/kg in offal for human consumption (EC, 2001). The Pb values obtained in this study is less than reported value of 0.46ug/g for swine in Canada as reported by Prior (1976). The Cadmium values range (0.01-0.03mg/kg) concentration in this study is less than value of 0.26ug/g reported for slaughtered swine in Canada by Korsrud *et al*.(1985) and other scholars in Casablanca city in morocco by Chafik *et al.* (2014) for cattle, sheep, equine and goats. The cadmium concentrations in this study is less than the maximum level of 1.0 mg/kg for human tolerance (EC, 2001).

Conclusion

These findings imply that consumers of these organs in Wukari metropolis are not exposed to hazard of high concentrations of these toxic metals in free range swine and dogs, , an indication of low pollution in the study environment

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