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Heavy Metals and Carcinogenic Risk Assessment in Free-Ranged Livestock of Lead-Contaminated Goldmine Communities of Zamfara State, Northern Nigeria

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Abstract : The consumption of meat is of great importance as it provides a good source of proteins and significant amount of essential trace element to the body. However, contamination of meat and meat products with heavy metals is becoming a serious threat to food safety and public health. Therefore, the present study is aimed to evaluate the concentration of some heavy metals in muscles and entrails of free-ranged cattle, sheep and goats. A total of sixty (60) fresh samples of muscles, liver, kidney, small intestines and stomach of free ranged cattle, sheep and goats were collected from abattoirs of different goldmine communities of Anka, Bukkuyum, Maru andTalata-Mafara Local Government Areas of Zamfara State, Nigeria. The samples were digested using 10 mL of a mixed 70% high grade concentration of HNO_3 and 65% HCl (4:1 v/v); the mixture was heated until dense fumes disappeared forming a clear transparent solution and diluted to 50 mL with deionized water. Actual concentrations of Cd, Cr, Cu, Co, As, Ni, Mn, Pb and Zn were determined using Microwave Plasma Atomic Emission Spectrophotometer (MP-AES). From the results obtained, goat liver had the highest mean concentration of lead, arsenic, cobalt and manganese (12.43± 0.31, 14.25±0.32, 3.47± 0.86 and 12.68± 0.92 mg/kg respectively) while goat kidney had the highest concentration of copper and zinc (10.08±0.61 and 24.16±1.30 mg/kg respectively). The highest concentrations of cadmium and nickel were recorded in sheep kidney (7.75± 0.65 and 2.08±0.10 mg/kg respectively). Cattle muscles had the highest chromium concentration than all the organs analysed. The target hazard quotients (THQs) for all the metals were below 1.0, but TR which is a risk indices for carcinogenicity indicates an alarming result that requires stringent control to protect public health.Therefore, intensive public health awareness on the risk associated with contamination of heavy metals in meat should be advocated.

Keywords : contamination, goldmine, heavy metals, meat
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