

Heavy metalloids Concentration in Poultry Feed, Edible Muscles, and Litter in Peshawar Valley, Khyber Pakhtunkhwa, Pakistan

Asfandiyar Ahmad¹, Said Muhammad^{*1}, Wajid Ali¹

¹ *National Centre of Excellence in Geology University of Peshawar, Peshawar, Pakistan*

**Email: saidmuhammad1@gmail.com*

The poultry industry is a vital source of dietary protein worldwide. The contamination of heavy metalloids (HMs) in poultry feed, edible muscles, and litter raises significant health and environmental concerns. This study evaluates the concentrations of HMs including Pb, Mn, As, Cr, Fe, Ni, Zn, Cu, and Cd in poultry products from selected districts including; Nowshera, Charsadda, Khyber and Peshawar in Khyber Pakhtunkhwa, Pakistan. Using a cross-sectional research design and a multi-stage sampling approach, samples were collected from markets and slaughterhouses and analyzed via inductively coupled plasma mass spectrometry (ICP-MS). The results revealed that Cd and As concentrations exceeded WHO permissible limits, with Cd reaching 0.624 mg/L (WHO limit: 0.5 mg/L) and As recorded at 0.456 mg/L. Pb was detected in nearly all samples, with a maximum concentration of 0.500 mg/L, though within acceptable limits. Statistical analysis using ANOVA and Pearson's correlation confirmed significant bioaccumulation of metals from feed to edible tissues, with strong correlations for Pb ($r = 0.79$, $p < 0.01$), Cd ($r = 0.64$, $p < 0.05$), and As ($r = 0.83$, $p < 0.001$). Hazard Quotient (HQ) analysis indicated that Cd (HQ = 1.25) and As (HQ = 2.53) pose severe health risks, necessitating urgent regulatory interventions. These findings underscore the importance of stringent monitoring and policy enforcement to mitigate HMs contamination in poultry production, ensuring food safety and environmental sustainability.

Keywords: HMs Concentration; Poultry Feed; Edible Muscles; Peshawar Valley

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