

# The vicious cycle of arsenic toxicity in environment: a study for livestock and human health threat in West Bengal, India

DR. ANTARA DAS, PH.D.<sup>1</sup>, MR. AYAN DE, MSC., PHD SCHOLAR<sup>1</sup>, DR. MADHURIMA JOARDAR, PHD<sup>1</sup>, DR. ARNAB MAJUMDAR, PH.D.<sup>2</sup>, DEEPANJAN MRIDHA<sup>1</sup> AND TARIT ROYCHOWDHURY<sup>1</sup>

<sup>1</sup>Jadavpur University

<sup>2</sup>Indian Institute of Science Education and Research (IISER) Kolkata

Presenting Author: tukaiantara18@gmail.com

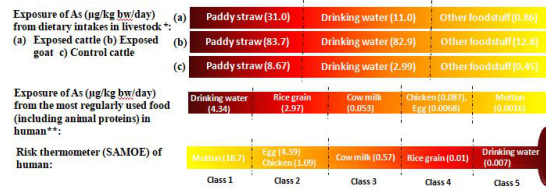
Since the past decades, arsenic, a natural pollutant contaminates underground water through different geogenic reactions. Being a class I carcinogen, its distribution into drinking water and food chain causes detrimental effect in human life [1]. Beside drinking water, arsenic contamination in the staple crops is the prime concern in recent time [2]. A study in West Bengal, India showed that about 12.5 tonnes of arsenic is withdrawn annually through irrigational water and its deposition rate on irrigated paddy soil is 1.08 kg/ ha [3]. The present study focuses on the evaluation of future health threat in human caused by the geochemical arsenic toxicity in domestic livestock in West Bengal. The forage of an adult cow/bull includes 40 L water and 5 kg of paddy straw per day. The per capita exposure rate of arsenic in exposed cattle are 31 µg/kg bw/day and 11 µg/kg-bw/day through paddy straw and drinking water, respectively. Different statistical interpretations have established the arsenic toxicity through their biological indices like urine, dung, tail hair, feather etc. Significant arsenic has been found in edible animal proteins like cow milk, boiled egg, liver and flesh of the exposed livestock. Moreover, use of arsenic-tainted milk and water in the making of dairy products is an added burden. Arsenic-contaminated edible animal by-products aggravates the human health risk which is estimated to be higher in adults than children. Similarly, risk thermometer approach revealed that the human health risk in the studied area falls in the order of drinking water followed by rice grain, cow milk, chicken, egg and mutton [4]. Additionally, elevated arsenic concentration in animal excreta may further cause environmental risk through bio-transformation; it may increase the indigenous soil arsenic concentration which can again be transferred into plant systems. Therefore, arsenic contamination works in form of a ‘cycle’ which is nothing but a daily threat to human life.

[1] Joardar et al. (2021). *Environmental Geochemistry and Health*, 43, 3027-3053

[2] Mridha et al. (2022). *Food Research International*, 111042

[3] Das et al. (2021a). *Groundwater for Sustainable Development*, 15, 100652.

[4] Das et al. (2021b). *Environmental Geochemistry and Health*, 43, 3005-3025



\*Avg. body weight of cattle: 313 kg (Gaur et al., 2003)  
 Avg. body weight of goat: 20.5 kg (Dhalger et al., 2014)  
 \*\*Avg. body weight of human: 60 kg (Islam et al., 2014)

