

Title: Evaluation of radioactivity concentration in farm fresh milk and concomitant dose to consumer

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Abstract: In this study, activity concentrations of natural radionuclides in 28 raw milk samples collected from different dairy farms in Dhaka city of Bangladesh were measured using a high-purity germanium (HPGe) detector for the first time. The activity concentration of ^{226}Ra , ^{232}Th , and ^{40}K in the investigated fresh milk samples ranged from BDL (Below detection level) to 26 ± 1.6 Bq/kg, BDL to 11.7 ± 3.3 Bq/kg and 101 ± 17 to 384 ± 32 Bq/kg, respectively. No artificial radionuclides were found in the investigated samples. Present results show inline within the range of available data in the literature. Annual committed effective doses were estimated following the consumption characteristics of raw milk by city population, values are found within the limiting range recommended by international organizations due to consumption of foodstuffs. Additionally, real-time gamma-ray dose rate in the farms/sampling locations was found in the range of 0.12 ± 0.01 – 0.20 ± 0.01 $\mu\text{Sv/h}$ by using a digital gamma survey meter (Gamma Scout) and the calculated maximum annual effective dose due to outdoor absorbed dose was found to be 0.25 mSv/y, which shows lower than the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) recommended limit of 2.4 mSv/y. This study indicates that the concentration of radionuclides in the farm fresh milk of Dhaka city does not pose any unwanted risk to public health, and it is safe to consume by both children and adults with the current intake level.

Keywords: Cow raw milk, Gamma-ray spectrometry, Activity concentration, Annual effective dose, Dhaka city

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