



RADIONUCLIDES IN LOCAL FOOD PRODUCTS OF KASHKADARYA REGION AND PRIORITIES FOR HYGIENIC CONTROL

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Abstract

This analytical review examines the results of radiological monitoring of 27 samples of local food products from Kashkadarya Region collected during summer–autumn 2025. A secondary descriptive analysis of summary Cs-137 and Sr-90 indicators from the supplied manuscript was performed. Mean Cs-137 values ranged from 1.9 to 7.5 Bq/kg, and Sr-90 values from 0.22 to 1.07 Bq/kg. Ratios of the means to the category-specific comparison values listed in the source did not exceed 4.69% for Cs-137 and 2.68% for Sr-90. A results table and a chart of relative indicators are presented. The limitations of group means, the need for product-specific detail and opportunities for further monitoring are discussed. These ratios characterize the groups studied but do not replace assessment of individual samples or population dose.

Keywords: Food products; caesium-137; strontium-90; radiological monitoring; Kashkadarya Region.

Introduction

Radiation monitoring of food products helps identify radionuclides that may enter the body through the diet. However, measurable activity is not equivalent to demonstrated damage to health. Hygienic interpretation requires a distinction between a substance's concentration in a product, its dietary intake and the



resulting dose. UNSCEAR's current assessment of public exposure [2] provides international context, while WHO materials on food [3] support consideration of consumption as a separate stage.

The aim of this article is to compare the reported group indicators for Cs-137 and Sr-90, define the limits of the conclusions and justify directions for subsequent monitoring. Unlike a general description of the radiation situation, the main question here concerns differences among food categories and the reliability of their hygienic interpretation.

Materials and analytical approach

The analysis was based on the manuscript by Li M.V. and Yuldasheva F.U., dated 2 February 2026 [1]. It describes 27 samples: 10 fresh plant-product samples, seven dried-product and nut samples, five meat samples and five samples of other livestock products. Sampling took place during summer–autumn 2025. An alternative version on the same topic contains different values and was not pooled with the selected table.

The source identifies an MKGB-01 RADEK spectrometer-radiometer and a method for gamma and beta radiation. Gamma spectrometry is described for Cs-137; the specific procedures used to determine Sr-90 require a separate protocol, because its activity cannot be attributed solely to gamma-spectrometric measurement. Primary spectra, detection limits and individual values were not available for analysis.

The calculated indicator was defined as the ratio of mean activity to the comparison level listed in the original table, multiplied by 100%. This is a descriptive ratio, not a risk estimate. The $\pm$ notation has been retained as given; the source does not specify whether it denotes a standard deviation, a standard error of the mean or measurement uncertainty. No statistical tests were performed.

Results and comparison of food groups

The highest mean Cs-137 concentration was recorded in the meat group, at 7.5 Bq/kg, and the lowest in fresh plant products, at 1.9 Bq/kg. Dried products and nuts had an intermediate value of 4.7 Bq/kg. The ranking differs for Sr-90: the



highest mean, 1.07 Bq/kg, occurs in dried products and nuts, followed by meat at 0.87 Bq/kg.

Mean Cs-137 values represented 1.58%, 3.13%, 4.69% and 3.88% of the comparison levels for the respective groups. For Sr-90, the ratios were 0.55%, 2.68%, 2.18% and 0.60%. All calculated mean ratios were below 100%; this does not demonstrate the absence of exceedances in every individual sample, because maxima and distributions are not reported.

The chart shows that ranking depends on the radionuclide. The priority of the meat group for Cs-137 does not imply the same priority for Sr-90. The observed differences are descriptive; they neither confirm a biological accumulation mechanism nor establish statistically significant differences among categories.

Table 1. Group indicators for food products from the original manuscript [1]

Group and sample count	Cs-137, Bq/kg	Sr-90, Bq/kg	Comparison levels Cs / Sr
Fresh plant products, n=10	1.9 ± 0.4	0.22 ± 0.01	120 / 40
Dried products and nuts, n=7	4.7 ± 1.9	1.07 ± 0.10	150 / 40
Meat, n=5	7.5 ± 4.2	0.87 ± 0.01	160 / 40
Other livestock products, n=5	3.1 ± 1.7	0.24 ± 0.01	80 / 40

Comparison levels are values from the original table, in Bq/kg. The source does not define the type of quantity denoted by $\pm$.

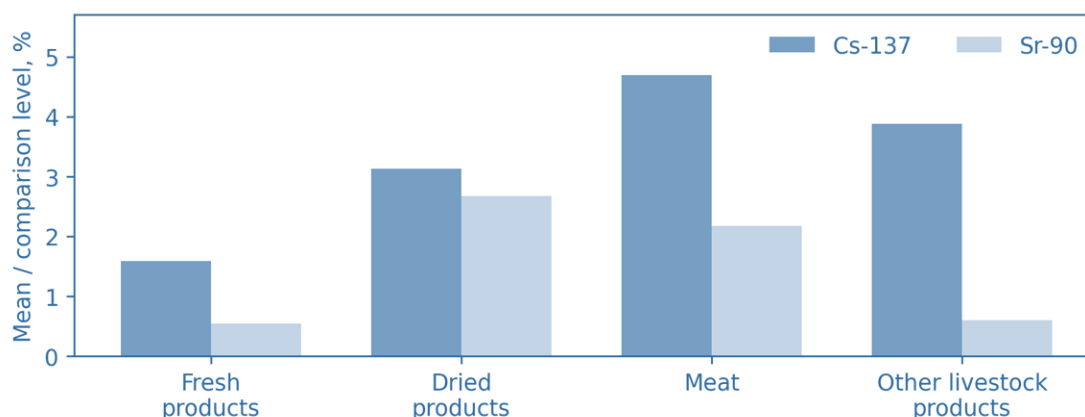


Figure 1. Mean activity as a percentage of the comparison level in the original table; authors' calculations based on [1]. This is not an indicator of dose or risk.



Discussion and prevention priorities

A higher concentration in one group may reflect the origin of raw materials, feed composition, the water content of the product or sampling characteristics. These explanations cannot be distinguished in this sample. Dried products should be compared with attention to their commercial form and mass basis: changes in moisture may affect Bq/kg without demonstrating additional radionuclide input. Levels of 80–160 Bq/kg for Cs-137 and 40 Bq/kg for Sr-90 are reproduced as values from the original table. The combined categories include heterogeneous products; therefore, each sample must be matched to its specific food category before a regulatory conclusion is drawn. The original study's reference to SanPiN 0366-19 does not replace this verification.

For the next stage, it is proposed to retain stratification by food product, include different seasons, record the production location and collect repeat samples using a consistent scheme. IAEA guide GSG-19 [4] links monitoring to protection objectives, while ALMERA resources [5] demonstrate opportunities for external verification of analytical reliability. The practical priority is the quality and traceability of each record.

The results do not allow assessment of individual consumption, accumulation in the body or morbidity. Recommendations should address the organization of monitoring and collection of missing data. WHO's general framework for environmental prevention [6] supports the planning of measures but does not constitute evidence of adverse effects in this sample.

Conclusion

In the four reported groups of local food products, mean Cs-137 and Sr-90 values were below the comparison levels in the original table. The highest relative Cs-137 value was observed in meat, and the highest Sr-90 value in dried products and nuts. Continued monitoring should be based on individual results, precise product classification and verified measurement uncertainty.



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