

Response to Dr. József Csurgai's review

I would like to thank the Reviewer for taking the time to review my thesis entitled: "Investigation of the geochemical behaviour and soil to food-chain transfer of various man-made radioisotope".

Questions:

1. Do you think clean feeding can reduce the radiation contamination levels?

It was observed that for some radionuclides (notably ^{137}Cs and ^{90}Sr at Degelen-like hydrologic settings), water/stream-connected meadows can dominate; so clean feed alone may not be enough if animals still drink contaminated water. Therefore, clean feeding can significantly reduce radiation contamination in sheep; however, in order to reducing radioisotopes accumulation effectively three steps of clean feed + clean water + management to reduce soil ingestion/dust on feed should be consider.

After radioactive fallout, sheep are mainly contaminated by eating contaminated grass, soil, and water. Clean feeding breaks this pathway by preventing further intake of radionuclides. Feeding uncontaminated hay, silage, grain, or pellets stops new exposure, while radionuclides already in the animal are gradually eliminated through natural biological processes. Clean feed also dilutes the proportion of contaminated material in the diet.

Clean feeding is most effective for radionuclides that move easily through the body. ^{137}Cs levels decline quickly because it behaves like potassium, and ^{131}I decreases rapidly due to its short half-life. However, clean feeding is less effective for ^{90}Sr , which behaves like calcium and remains in bones for long periods.

2. Can we use wool as a proxy for Sr contamination?

A strong positive correlation between ^{90}Sr activity in wool and bone were observed and it can be indicated that wool can serve as a proxy for skeletal ^{90}Sr burden in sheep when properly cleaned and standardized.

Then, Yes, wool can serve as a useful proxy for environmental or dietary ^{90}Sr exposure in sheep, but only under specific conditions and with important caveats. Strontium can substitute for calcium during wool fiber formation, becoming incorporated into the keratin matrix. Because wool grows continuously, its ^{90}Sr content reflects long-term exposure, and its non-invasive, easily archived sampling makes it a practical tool for environmental monitoring. Wool can be used to compare exposures, trace environmental or dietary Sr using $^{87}\text{Sr}/^{86}\text{Sr}$ isotopes, and screen for contamination trends.

However, wool also readily absorbs ^{90}Sr from external sources such as dust, soil, rain, manure, and aerosols, which can mask the internal metabolic signal. This makes rigorous washing and decontamination essential before analysis. Furthermore, since ^{90}Sr primarily accumulates in bones and teeth rather than soft tissues, wool ^{90}Sr does not replace direct bone measurements but provides an indirect indicator of skeletal ^{90}Sr burden rather than total absorbed dose. ^{90}Sr levels in wool

also vary with factors such as growth rate, age, mineral status (e.g., Ca and Mg), diet, season, and fleece location.

Therefore, wool is best suited for detecting relative or isotopic ^{90}Sr signals rather than for precise dose-response measurements or health-risk assessments.

Sincerely yours,

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Veszprém, 2025.01.06