A study of iodine concentration in soils and grasses of pastures of Bryansk and Gomel regions affected by the Chernobyl accident

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Bryansk (Russia) and Gomel (Belarus) regions were among the areas most exposed to the so-called "radioiodine impact" (\textsuperscript{131}I) that occurred as a result of the Chernobyl accident in 1986. Medical examination of different groups of local population after the accident revealed a pronounced increase in thyroid cancer among children which was associated with not only \textsuperscript{131}I fallout but also with a deficiency of natural iodine in these areas \cite{1}.

The aim of the research was to study iodine in vegetation and soils of different grasslands adjacent to rural settlements in the Bryansk and Gomel regions and used by local residents for grazing. The basic original data was iodine concentration in soil and plant samples collected in the affected areas of Russia and Belarus in 44 test sites.

Soil samples were collected from upper layers 0-5, 5-10 and 10-20 cm deep with the help of the soil auger, averaged vegetation samples were taken from the plots 25x25 or 50x50 cm depending upon the vegetation density. Iodine determination was performed with the help of kinetic rhodanide-nitrite technique.

The results showed insignificant difference of iodine concentration in soil samples taken from various depth and considerable variation in the content of iodine in the upper soil layer (0-5 cm) both in the Bryansk region (0.24-1.36 mg/kg, n=29) and in the Gomel region (0.23 - 5.27 mg/kg, n=15), depending upon soil type and texture.

In the Bryansk region, the highest average iodine content was observed in gray soils characteristic for its central part (mean value 0.85±0.12 mg/kg in the top 5-cm layer). In the Gomel region, the highest iodine content was observed in meliorated peat-bog soils (5.27 mg/kg, mean value equaled to 1.02±0.42 mg/kg in the top 5-cm layer).

The iodine content in the pasture vegetation ranged from 23 µg/kg to 271 µg/kg dw. Both median and mean value of iodine concentration in vegetation of upland meadows (autonomous landscapes) were significantly lower than those in lowland meadows (57 and 113 µg/kg; 67±10 and 125±16 µg/kg correspondingly).

Accounting of considerable soil ingestion by cows we hypothesize that grazing in lowland pastures with the highest stable iodine content in soils and domination of hydrophyte plant species causes...
higher $^{127}$I consumption by cattle and transfer to milk. In case of contamination of the area by $^{131}$I this can lead to a relatively lower $^{131}$I transfer to milk, other conditions being equal.

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References