



ACTIVITY OF CS-137 IN SOME FOODSTUFFS IMPORTED TO SLOVAK REPUBLIC

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Laboratory of radiometry and radioecology in Nitra was established in 1987 after the Chernobyl accident. One of its main aim is the monitoring of agricultural production as from Slovak territory as imported from other countries.

In this paper the results of Cs-137 activity in some foodstuffs imported to Slovak Republic are presented. The results are discussed from two points of view:

1. sort of foodstuffs (we chose two sort - the fish and fish products and beef, pork and bowels)
2. country of origin (we chose three countries - Germany, Norway and the Ukraine).

The above mentioned choice is based mainly on staistical grounds, we evaluated data sets with total population at least 100, the only exception is the data set for the Ukraine. For evaluation of our data sets the statistical procedures developed for left-censored data sets with assumption of lognormal distribution were used [1]. The analyzed data sets were obtained by semiconductor gamma spectrometry in Laboratory of Radiometry and Radioecology.

The results are reported in six tables with basic statistical characteristics like number of samples, number of samples with activity >MDA, median, arithmetic mean, variance and maximum value.

In tab.1 there are results for fish and fish products (concerning mainly sea fish and products). In general we can conclude that fish belong to the most contaminated sort of foodstuffs. More then 50% of samples were positively identified as Cs-137 containing.

From tab.2 (beef and pork) we can see that this sort of foodstuffs is considerable less contaminated than fish. This sort of foodstuffs is contaminated comparable to those from Slovak and Czech Republic [2,3].

In the case of countries (tab.3, tab.4 and tab.5) the most contaminated foodstuffs come from Norway, what can be explained by composition of imported foodstuffs (mainly sea fish).

In tab.6 the ten highest values from all data set (for all sorts of foodstuffs measured within 8 years - 1024 samples in all) are reported. Except one sample, beef with the highest activity (80.2 ± 4.9) Bq/kg from Finland, the rest are sea fish from Baltic countries, but unfortunately the origin of analyzed fishes is unknown, so we can make no decision about Baltic sea.

References

- 1) R. O. Gilbert, R. R. Kinnison: Statistical methods for estimating the mean and variance from radionuclide data sets containing negative, unreported or less-than values. *Health Physics* **40**, 1981, pp.377-390
- 2) Acta hygienica, epidemiologica et microbiologica, příloha č.7/1993, Zpráva o radiační situaci na území ČR a SR v roce 1992, Ústav jaderných informací Praha, 1993
- 3) Zpráva o radiační situaci na území ČR v roce 1993. Státní zdravotní ústav Praha, 1994

Tab.1 Activity of Cs-137 in fish and fish products

YEAR	N	>MDA	MEDIAN	MEAN	VAR.	MAX. VALUE
1988	28	17	1,06	0,98	2,68	5.80 +/- 1.00 NOR.
1989	30	23	1,20	1,04	1,95	4.82 +/- 1.25 NOR.
1990	62	40	0,63	0,82	3,51	15.55 +/- 2.30 USSR
1991	37	12	0,33	0,38	1,64	2.36 +/- 0.40 DENM.
1992	60	34	0,40	0,71	6,21	10.65 +/- 0.96 USSR
1993	172	73	0,34	0,53	3,41	12.82 +/- 1.08 EST.
1994	103	71	0,36	0,49	2,99	11.73 +/- 0.89 POL.
1995	109	62	0,26	0,34	2,98	11.24 +/- 0.75 LIT.
SUM	601	332	0,34	0,54	3,51	15.55 +/- 2.30 USSR

Tab.2 Activity of Cs-137 in beef, pork and bowels

YEAR	N	>MDA	MEDIAN	MEAN	VAR.	MAX. VALUE
1988	10	7	1,73	1,15	2,93	3.80 +/- 0.80 GDR
1989	7	7	1,40	0,97	1,58	2.10 +/- 0.70 GDR
1990	10	5	0,35	0,40	1,49	1.07 +/- 0.34 GDR
1991	20	2	0,38	0,42	1,09	0.76 +/- 0.21 HUN.
1992	89	31	0,30	0,47	2,85	6.26 +/- 0.66 LIT.
1993	40	6	0,28	0,30	1,19	1.10 +/- 0.24 DEN.
1994	37	7	0,30	0,38	3,23	80.19 +/- 4.92 FIN.
1995	5	3	0,21	0,29	7,26	3.13 +/- 0.28 GER.
SUM	218	68	0,30	0,43	2,38	80.19 +/- 4.92 FIN.

Tab.3 Activity of Cs-137 in foodstuffs from Germany

YEAR	N	>MDA	MEDIAN	MEAN	VAR.	MAX. VALUE
1988	11	8	0,7	1,04	2,90	3.80 +/- 0.80 pork
1989	17	13	1,10	0,81	1,82	2.90 +/- 0.70 fish
1990	33	21	0,60	0,83	3,50	8.19 +/- 1.83 fish
1991	10	3	0,33	0,34	1,14	0.65 +/- 0.36 fish
1992	13	4	0,27	0,28	1,36	0.72 +/- 0.22 fish
1993	23	8	0,41	0,41	1,29	1.61 +/- 0.31 fish
1994	26	9	0,25	0,27	1,57	2.32 +/- 0.43 fish
1995	49	20	0,24	0,26	1,64	3.13 +/- 0.28 beef
SUM	182	86	0,34	0,42	2,36	8.19 +/- 1.83 fish

Tab.4 Activity of Cs-137 in foodstuffs from Norway

YEAR	N	>MDA	MEDIAN	MEAN	VAR.	MAX. VALUE
1988	14	10	1,65	1,36	2,23	5.80 +/- 1.00 fish
1989	11	10	1,50	1,48	1,70	4.82 +/- 1.25 fish
1990	12	11	0,84	0,78	1,31	1.50 +/- 0.71 fish
1993	27	19	0,79	0,72	1,61	2.12 +/- 0.40 fish
1994	43	30	0,34	0,33	1,18	0.94 +/- 0.12 fish
1995	15	9	0,41	0,38	1,37	1.15 +/- 0.26 beef
SUM	123	90	0,47	0,58	1,98	5.80 +/- 1.00 fish

Tab.5 Activity of Cs-137 in foodstuffs from the Ukraine

YEAR	N	>MDA	MEDIAN	MEAN	VAR.	MAX. VALUE
1992	14	7	0,29	0,64	8,57	6.32 +/- 0.49 eligo
1993	3	3	0,34	0,45	1,70	1.03 +/- 0.22 pork
1994	26	11	0,30	0,25	1,63	0.92 +/- 0.43 eligo
1995	17	4	0,19	0,19	1,23	0.36 +/- 0.30 eligo
SUM	60	25	0,25	0,30	2,68	6.32 +/- 0.49 eligo

Tab.6 The ten highest values of Cs-137 and Cs-134 activity

FOOD	COUNTRY	YEAR	CS-137 ACTIVITY	CS-134 ACTIVITY
PORK	FINLAND	1994	80.19 +/- 4.92	3.03 +/- 0.41
FISH	USSR	1990	15.55 +/- 2.30	1.97 +/- 0.47
FISH	DENMARK	1990	13.70 +/- 2.54	1.64 +/- 0.60
FISH	ESTONIA	1993	12.82 +/- 1.08	0.81 +/- 0.17
FISH	ESTONIA	1993	12.12 +/- 0.80	0.82 +/- 0.10
FISH	POLAND	1994	11.73 +/- 0.89	0.50 +/- 0.36
FISH	LATVIA	1993	11.42 +/- 0.82	0.69 +/- 0.12
FISH	LITHUANI	1995	11.24 +/- 0.75	0.38 +/- 0.10
FISH	POLAND	1993	11.14 +/- 0.88	0.70 +/- 0.13
FISH	DENMARK	1990	10.70 +/- 2.20	1.40 +/- 0.60