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The Iodine Content of Swedish Dairy Milk

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The Swedish dairy milk iodine-127 content was determined and evaluated with regard to its protective effects against thyroidal uptake of iodine-131 from fall-out.

During the first years of life milk dominates as food and to a considerable extent this milk comes from cows. For the synthesis of thyroid hormones children depend on their iodine intake and thus on the iodine content of dairy milk. The iodine content of the milk is also of interest because milk is more or less contaminated with radio-iodines formed by fission when nuclear weapons are tested, in case of reactor accidents *etc.* The iodine isotopes 129–136 might occur but due to physical half-life and atom per cent formed, only two radioisotopes are of importance *i. e.* iodine-131 and iodine-132. Iodine-132 is formed by decay of tellurium-132 but its half-life is only 2 h. Iodine-131 has a half-life of 8 days.

In this article the variations of stable iodine in dairy milk from some Swedish dairies will be discussed together with the contamination with iodine-131 observed in 1962. The 1961–1962 series of nuclear tests gave rise to contamination of milk with iodine-131.

MATERIAL AND METHODS

From April 1962 to March 1963 milk samples were taken from six Swedish dairies once or twice monthly. The content of inactive iodine was determined according to *Barker et al.*[1] as total iodine. All analyses were made in duplicate. The standard deviation (S. D.) for a single determination was ± 2.5 μg per l milk.

RESULTS

In Table 1 the monthly mean values for the six dairies are given as μg of iodine per l milk.

DISCUSSION

It is obvious from the values in Table 1 that there is a considerable monthly variation of iodine content in the milk. The lowest values occur during the sum-

Table 1. Total iodine in milk from six dairies in μg/l, April 1962 to March 1963.

Dairy	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Febr.	March	Mean ± S.D.
Malmö	107	53	31	42	41	58	45	41	65	63	50	43	53 ± 20
Kalmar	44	31	13	18	18	21	29	22	30	52	56	30	30 ± 18
Skara		74	22	21	24	33	64	109	64	52	76	65	55 ± 29
Eskilstuna	66	48	14	20	17	25	37	63	66	62	78	64	47 ± 21
Östersund	56	60	50	28	33	29	31	41	54	40	42	28	41 ± 11
Boden	22	27	16	22	56	54	68	33	39	26	15	51	36 ± 25
Average	59	49	24	25	32	37	45	52	53	49	53	47	

mer months, which could be due to dietary changes. The average monthly values vary between 24 and 59 μg/l whereas in single determinations values have been found varying between 11 and 116 μg/l. The radio-iodine (^{131}I) content of Swedish dairy milk between August 28th and December 3rd, 1962 varied between 0 and 406 pC/l. The measurable values in connection with fall-out from nuclear tests varied between 15 and 406 pC/l[2]. Determinations of radio-iodine in milk from single farms during the autumn 1962 gave the maximal value of 3 000 pC/l[2]. The mean intake of iodine-131 in Sweden during 1962 was about 30 000 pC[2].

At an expert meeting in Oslo in September 1962 it was decided that an accumulated yearly intake of 200 000 pC of iodine-131 warrants actions from the health point of view[3]. The maximal allowable initial concentration of iodine-131 in milk after a reactor accident in Sweden would be 70 000 pC/l corresponding to a yearly intake of 800 000 pC. The highest observed radio-iodine content in milk from a Swedish farm (3 000 pC/l) corresponds to a yearly accumulated intake of 100 000 pC[2].

If the observations on stable iodine and radio-iodine of Swedish dairy milk during 1962 is used for determination of the specific avtivity (C of ^{131}I/g iodine) in milk the variation is $0 - 17 \times 10^{-6}$. For single determinations (in single farms and single dairy samples respectively) the maximal value will be 27×10^{-5}. It is well known expecially since radio-iodine has been in general use for diagnosis of thyroidal disorders that inactive iodine greatly reduces the radio-iodine uptake by the thyroid gland. It is thus from a hygienic point of view important that the milk contains as much inactive iodine as possible without causing allergic conditions in disposed milk drinkers. Furthermore, in cases of expected radio-iodine fall-out, it is helpful if this content is as constant as possible. It does not matter, however, if the milk iodine comes from the cow's udder or from iodine-containing sterilizing agents used in the farms and/or dairies.

The daily intake of inactive iodine for adults is stated to be about 50 μg[4]. Determination of urinary excretion of iodine in 89 persons from around Stockholm who were not taking iodinated medicines gave a mean daily excretion value of 104 ± 49 μg which obviously corresponds to a considerably higher mean intake of iodine. The daily requirement for children should be proportional to the caloric needs and thus be in the order of 25—50 μg. With a milk consumption of one liter per day the milk iodine content should be at least 25, and preferably 50 μg/l. From the values in Table 1 it is clear that the milk examined contains just this amount. With the present iodine content however no depressing action on the thyroidal uptake of radio-iodine can be expected. This is especially true for the summer months. It seems therefore that it should be of value if the iodine content of dairy milk was increased. The best way to achieve this would no doubt be to increase the iodine in the minerals given to the cows.

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