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A systematic review of the iodine concentration in milk from around the world

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Iodine is vital for thyroid hormone synthesis and is essential for human life[(1)]. Milk and dairy products are the primary dietary source of iodine across Europe, contributing over a third of adult intake in Ireland, Finland, Norway and the UK[(2)]. Milk-iodine concentration varies according to the diet of dairy cows, influenced by season and dairy-production system[(3)].

The primary aim was to systematically review and compare the iodine concentration of milk from around the world to that from the UK. The secondary aims were to identify variation in milk-iodine concentration because of season (summer vs. winter) or production system (conventional vs. organic).

First, online national food composition databases were searched for milk-iodine concentration. A systematic review was then conducted using four abstract and citation databases (Embase, PubMed, Scopus and Web of Science) to identify relevant literature published from January 2006 to December 2022. Where a country had multiple values, iodine concentration from conventionally farmed, all-season, pasteurised milk was used to represent it. For studies that reported only separate summer and winter values, an average was calculated to reflect a year-round value. Studies that used certified reference materials (CRMs) to verify laboratory accuracy were used in preference to those without.

Milk-iodine concentration was reported in 23 national food composition databases. The systematic literature search identified 661 articles, of which 46 were eligible. Values for 27 countries were identified through research papers, of which 56% had used CRMs in the laboratory method. When combining data from both sources, 36 countries had values for milk-iodine concentration, ranging between 3.3 μg/100 g (in Slovenia) and 50.2 μg/100 g (in Latvia), and a mean of 21.6 μg/100 g. UK milk was the second highest; 46.7 μg/100 g in Northern Ireland, and 41.4 μg/100 g in England. Data on seasonal variation were available for 14 countries; one country showed equal summer and winter values, while all others had a greater iodine concentration in winter milk (by up to 29.9 μg/100g). Iodine variation according to dairy-production system was measured in seven countries; in all but two countries, milk-iodine concentration was up to 17 μg/100 g higher in conventional milk than in organic varieties.

Across the world, but especially in the UK and other countries where salt iodisation is not routinely implemented, cows' milk is an important source of iodine. The variability in milk-iodine concentration between countries means that country-specific guidance on dietary iodine sources is required. Our results show that overall, season has greater impact on milk-iodine content than farming method, and dairy practices that minimise seasonal variation in milk iodine may be required. The comparability of milk-iodine concentration around the world is limited by the lack of data on laboratory accuracy, for example from CRMs.

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