Even giant pandas need a little iodine

Milewski AV, Dierenfeld ES Supplemental iodine as a key to reproduction in pandas? Integrative Zoology. 2012;7(2):175-82.

Pandas are endemic to iodine-poor environments and consume bamboo, a food rich in goitrogens. The authors suggest iodine deficiency could contribute to the poor reproductive rates of pandas.

Background

The giant panda (Ailuropoda melanoleuca) is listed as critically endangered. This bear faces a high risk of extinction in the wild, with small populations, very restricted wild habitat and increasing reliance on breeding programs. Bamboos eaten by pandas are likely to be deficient in iodine and/or contain compounds known to be antagonistic to the thyroid (goitrogens). Low iodine status could also help explain the limited population density and slow pace of life of pandas, as well as other adaptations, such as their proportionately small neonates even compared to other bears.

Because of their iconic status and the great expense of conservation efforts, the rates of growth of panda populations remain disappointing. However, there is an elementary approach of proven effectiveness in humans and livestock that might have been overlooked. This is based on the critical importance of dietary micronutrients, particularly iodine.

Poverty of iodine in panda habitat

The natural habitat and diet of pandas (such as in Sichuan Province in China) are particularly poor in iodine because of altitude, distance from the sea and the flushing effects of monsoonal rains. Iodine deficiency in humans from Sichuan and adjacent provinces in China is well-known. The leaves of understory bamboo are poor in iodine even where soils are rich in iodine. Furthermore, central Chinese bamboos are among the most goitrogenic of plants, because they are rich in cyanogenic glycosides, thiocyanate and/or glucosinolates. Thiocyanate competes with iodide in the thyroid and the mammary glands and crosses the placental barrier. In this way, circulating thiocyanate exacerbates environmental shortage of iodine. A combination of an iodine-poor environment and a goitrogenic diet can be expected to reduce reproductive performance in pandas.

Iodine as a spur to reproduction?

Although it remains unknown whether reproductive condition and breeding success in pandas in their natural habitats are controlled by the supply of iodine, this seems possible by analogy with the situation in humans and livestock. Wild pandas can theoretically compensate to some extent for nutritional deficiencies by dietary choices and seasonal movements, but such options are limited in captivity. However simple it may be in principle to supplement the diet with iodine, the limited natural sources of iodine in panda habitat, and the failure of pandas to exploit either mineral licks or epiphytic lichens to any extent, might mean both a relative specialization for iodine poverty, and a particular sensitivity to excess iodine in the giant panda. Although we should be as wary of excess iodine as of insufficient iodine in the case of pandas, it seems feasible that achievement of the right balance could make a difference to their reproductive success.