

## Problems related to a one-sided menu. Corn turns hamsters into cannibals

**The European hamster (*Cricetus cricetus*) population, still very abundant in French Alsace as late as the 1960s, has been reduced to some 450 individuals today.** What is the way of life of this small rodent? Why is its habitat collapsing? What challenges are to be faced to preserve Alsatian large hamster populations?



So cute !

The main reason generally put forward for the population decline remains the destruction of the hamster's habitat by the propagation of industrial and inappropriate crops — corn in particular — and intensive (and excessive) urbanization causing fragmentation of *Cricetus* habitats. This sounds like a very plausible explanation for what can only be described as a very serious and extremely alarming situation. Witness this striking title in the scientific literature: *Diets derived from maize monoculture cause maternal infanticides in the endangered European hamster due to vitamine B3 deficiency*. A diet of corn (or maize) turns hamster mothers into deranged

cannibals that devour their offspring [Tissier et al. 2017].

**Worldwide changes to forests and farmlands, aquatic ecosystems, and air are driven by our need to provide food, fibre, water, and shelter to more than seven billion people.** Ironically, just as our land use practices are degrading ecological conditions across the globe, humanity has become dependent on an ever increasing share of the biosphere's resources. Global croplands, pastures, plantations, and urban areas have significantly expanded. Unfortunately, this is accompanied by large increases in energy, water, and fertilizer consumption, along with considerable losses of biodiversity [Foley et al. 2005]. Moreover, the resulting decline in biodiversity has led to a reduction in so-called ecosystem services, which are seriously affecting human safety and nutrition. Indirect land-use effects, meaning those mediated by biodiversity loss and by changes to functional composition, are found to be as strong as direct effects [Foley et al. 2005; Diaz et al. 2006; Allan et al. 2015].

**Whereas it formerly found its nourishment in a variety of grains, roots and insects, the burrowing hamster now lives in a sea of industrially grown corn.** Earlier investigations looked at the impact of pesticide exposures and mechanised ploughing, which can destroy the hamsters' underground caves, especially during hibernation, but the possible link with what they eat remained largely unexplored.

The findings, reported by Tissier et al. [2017], point to industrial scale monoculture as the culprit. The monotonous diet leaves the animals starving, as the French team discovered. A first set of laboratory experiments with wild specimens compared wheat and corn-based diets, with side dishes of clover or worms. Though there was virtually no difference in the number of pups born, when it came to survival rates, the difference was dramatic. About 80 % of the pups born of mothers feasting on

wheat-and-clover or wheat-and-worms were weaned. However, only ~5 % of the baby hamsters whose mothers ate corn instead of wheat made it that far. Corn lacks several micronutrients such as calcium, tryptophan, lysine, riboflavin, and especially vitamin B3. Vitamin B3 is also known as niacin and nicotinic acid.

It is one of the essential human nutrients. Pharmaceutical and supplemental niacin are primarily used to treat hypercholesterolemia (high cholesterol) and pellagra (niacin deficiency). Insufficient niacin in the diet is known to cause nausea, skin and mouth lesions, anaemia, headaches, and tiredness in humans [Wikipedia]. An unbalanced corn-based diet has been associated with high rates of homicide, suicide and cannibalism in humans [Ernandes et al. 1996; Ernandes 2002] and may cause pellagra, which decimated millions of people in North America and Europe between the mid-18<sup>th</sup> and the mid-20<sup>th</sup> century [Hegyí et al. 2004].

**Even more disturbing is how the pups perished.** Hamster mothers stored their living pups with their hoards of maize before eating them. Tissier et al. [2017] reported that the high propensity of corn caused abnormal maternal behaviour, infanticide and siblicide, associated with diarrhoea and skin problems in the pups. The symptoms obviously resemble those observed in humans affected by pellagra [Hegyí et al. 2004] as well as the symptoms of canine black tongue disease.

In an additional set of experiments, the hamsters were offered corn-based diets, one of them with vitamin B3 added. Sure enough, the vitamin B3-enriched diet eliminated the horrific symptoms and prevented the hamster mothers from eating their offspring. The dire consequences of the vitamin B3-deficient corn diet, the scientists concluded, stemmed not from reduced maternal hormones, but rather from a change in the nervous system that induced the same dementia-like behaviour previously diagnosed in humans.

**Monoculture in agriculture is really bad for biodiversity.** Given the intensification of maize monoculture across the globe — inherently associated with a reduction in diversity and abundance of other plants, soil fauna and microorganisms — the overabundance of corn compared with other food plants in the diet of farmland animals will be detrimental for their survival and fitness.



*An undeniably monotonous landscape*

And what about humans who intentionally or unintentionally fail to consume well-balanced and varied diets?

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