

## DSM in Food, Beverages & Dietary Supplements

### Vitamin B2 (riboflavin)

DSM is a leading supplier of riboflavin, an essential constituent of all living cells - which when lacking can lead to symptoms including fatigue and sore throats.

Vitamin B2, also called riboflavin, is one of the most widely distributed water-soluble vitamins. The term 'flavin' originates from the Latin word 'flavus', referring to the yellow color of this vitamin. In the body, riboflavin is primarily a component of the coenzymes.



Vitamin B2 is an essential constituent of all living cells. However, there are very few rich sources in food: Yeast and liver have the highest concentrations, but they don't have much relevance to today's human nutrition.



The most important dietary sources are milk and milk products, lean meat, eggs and green leafy vegetables. Cereal grains, although poor sources of riboflavin, are important for those who rely on cereals as their main dietary component. Fortified cereals and bakery products supply large amounts.

#### Health functions

A sufficient intake of vitamin B2 (riboflavin) is important as it helps the body to:

- Convert food (carbohydrates) into glucose to produce energy
- Neutralize 'free radicals' that can damage cells and DNA. This neutralizing 'antioxidant' effect may reduce or help prevent some of the damage contributing to the aging process, as well as the development of a number of health conditions like heart disease and cancer
- Convert vitamin B6 and vitamin B9 into active forms.

The European Food Safety Authority (EFSA), which provides scientific advice to assist policy makers, has confirmed that clear health benefits have been established for the dietary intake of vitamin B2 in contributing to:

- Normal energy-yielding metabolism
- Normal metabolism of iron in the body
- The maintenance of normal skin and mucous membranes
- The maintenance of normal red blood cells
- The maintenance of normal vision
- The protection of cell constituents from oxidative damage
- The maintenance of the normal function of the nervous system
- The reduction of tiredness and fatigue.

Individuals who have inadequate food intake are at risk of vitamin B2 deficiency, particularly children from low socio-economic backgrounds, elderly people with poor diets, chronic 'dieters' and people who choose to exclude milk products from their diet (vegans).

Symptoms of riboflavin deficiency include fatigue, slowed growth, digestive problems, cracks and sores around the corners of the mouth, swollen magenta tongue, eye fatigue, and swelling and soreness of the throat.

## Supplements and food fortification

Vitamin B2 (riboflavin) is available as an oral preparations, as a standalone, or, most commonly, in multivitamin and vitamin B-complex preparations and even as an injectable solution. Crystalline riboflavin is poorly soluble in water, which means riboflavin-5'-phosphate, a more expensive but more soluble form, has been developed for use in liquid formulations.

Riboflavin is one of the vitamins often added to flour and bakery products and beverages to compensate for losses during processing. It is also used to enrich milk, breakfast cereals and dietetic products. Because of its bright yellow color, riboflavin is sometimes added to other drugs or infusion solutions as a marker.