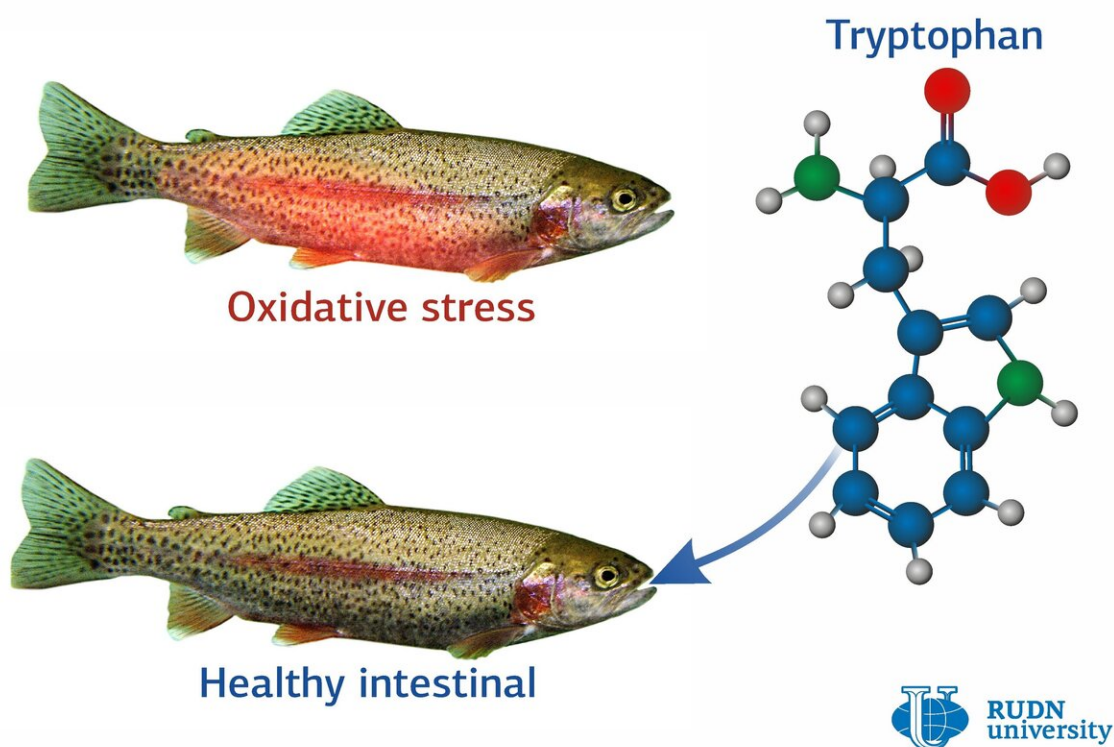


Tryptophan supports intestinal tracts of stressed trouts

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Tryptophan Supports the Work of Intestinal Tract in Trouts Under Stress, Says a biologist from RUDN University Credit: RUDN University

A biologist from RUDN University has found the most beneficial concentration of tryptophan for rainbow trout. When added to the diet of

the fish, this amino acid supports the immune system and reduces oxidative stress in the intestinal tract caused by the overpopulation of fish farms. The results of the study were published in *Aquaculture*.

The fish in fish farms are under constant stress because of overpopulation, transportation, malnutrition and low quality of water. All these factors have a negative impact on the health of the fish and cause diseases and death. However, they cannot be completely eliminated: it simply makes financial sense to keep a lot of fish in small farms, as it increases production volumes. The consequences of overpopulation include weak immunity, changes in chemical processes in fish bodies, and [oxidative stress](#) (cell death as a result of oxidation). In particular, oxidative stress can cause the [intestinal tract](#) walls to become thinner, which makes fish more susceptible to dangerous pathogens. A biologist from RUDN University conducted an experiment and found a way to protect the fish from oxidative stress without putting additional financial burden on fish farms.

Tryptophan is an amino acid that affects the [immune system](#) and supports antioxidant response, i.e., a body's ability to resist oxidative stress. Tryptophan is used to treat depression in humans and is also added to animal foodstuff to make it more balanced. Its production is cheap, making it easily available in the market. The scientist from RUDN University studied the effect of tryptophan on [enzyme activity](#) and the expression of immune genes in the intestinal tracts of fish.

The subject of the study was *Oncorhynchus mykiss*, or [rainbow trout](#), which is quite popular in [fish farming](#). Two groups of trout were kept in an underpopulated (15 kg of fish per 1 square meter) and overpopulated (25 kg per 1 square meter) enclosure. In each group, three subgroups were identified. Each subgroup got its own diet with either no tryptophan, or 5 or 10 grams of tryptophan per 1 kg of feed. After 70 days, the scientists assessed the level of oxidative stress resistance in the

intestinal tracts of the fish by measuring enzyme activity and the expression of genes that participate in immune and antioxidant response.

The fish that consumed 5 g of tryptophan showed higher stress resistance levels than the fish that received no amino acid at all: Enzymes and genes in charge of the antioxidant response were 1.5 to two times more active in the former group. However, a higher dosage of tryptophan (10 g) reduced gene expression and slowed down the activity of antioxidant enzymes.

"Adding 5 g of tryptophan per 1 kg of feed increased the immune response in the intestinal tracts of rainbow trout and therefore reduced the oxidative stress, even in the conditions of overpopulation. However, larger amounts of [tryptophan](#) weaken the reaction to stress factors, which may be harmful for fish health," said Prof. Morteza Yousefi, Ph.D. from the Department of Veterinary Medicine, RUDN University.

The results of the study could prevent the death of fish while preserving high density of [fish](#) population in farms. Prof. Yousefi plans to focus his future studies on more in-depth details.

More information: Seyyed Morteza Hoseini et al. Effects of rearing density and dietary tryptophan supplementation on intestinal immune and antioxidant responses in rainbow trout (*Oncorhynchus mykiss*), *Aquaculture* (2020). [DOI: 10.1016/j.aquaculture.2020.735537](https://doi.org/10.1016/j.aquaculture.2020.735537)

Provided by RUDN University

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