



Microbiomes in the gut: Health in humans and animals

Key takeaways

Microbiome research can inform the development of **soy products** that positively influence **gut microbiomes**, which can help support health by:

- **Training the immune system** to fight pathogens
- **Breaking down fibres** and other indigestible food components
- **Protecting against disease** and supporting overall well-being

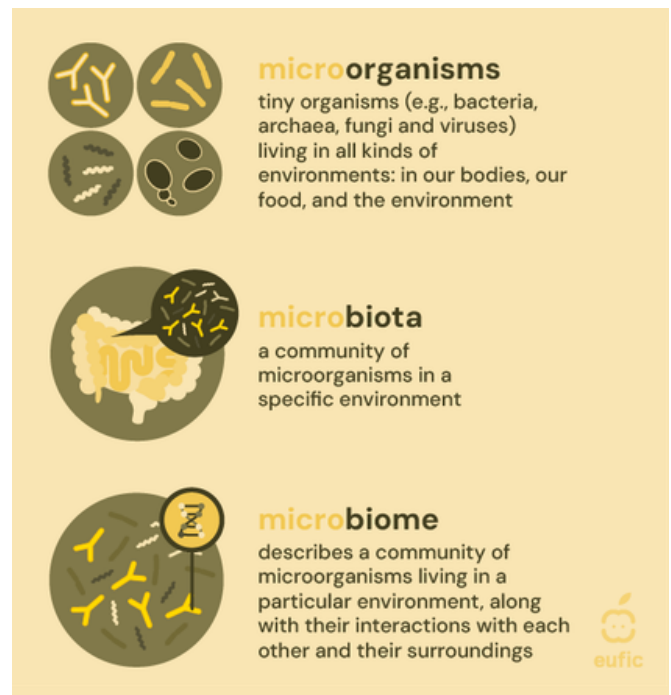


Figure 1: What is the microbiome?

Understanding microbiomes in our food

Scientists are rapidly expanding our understanding of how gut microbiomes influence health, but many questions remain. MICROBIOMES4SOY investigates how **soy-based foods and feeds affect the microbiomes of humans and animals** to support healthier and more sustainable food systems.

The project conducted a **dietary trial** to examine the impact of **replacing red meat with tofu** served along miso paste, and whether this influences the human gut microbiome and overall health. Tofu was selected because it provides **high-quality protein**, while miso, a fermented soybean paste, may provide further **health benefits due to the fermentation process**.

MICROBIOMES4SOY also explores **sustainable aquaculture**. Fish farming currently relies heavily on fish meal in feed, as high levels of soybean replacement can cause negative health impacts in some fish species. **Fermenting soybeans**, however, could **reduce anti-nutritional factors**, leading to healthier feed and a more **sustainable alternative**. Researchers will investigate whether these feeds are sufficient replacements that match market standards for fish growth and health. Additionally, fermented soy-based feeds could provide added benefits by **positively impacting fish gut microbiome composition** and overall performance, while **reducing reliance on marine resources for fish meal**.

Plant based protein & aquaculture

Replacing some animal protein with plant protein can benefit health, with the gut microbiome playing an important role. For example, gut microorganisms convert compounds from red meat, such as carnitine, into trimethylamine, which is later transformed in the liver into compounds associated with an increased risk of cardiovascular disease. Reducing meat consumption could hence reduce this risk.

Research also shows **a two-way relationship between soy-based food and the gut microbiome in humans**. Gut microorganisms help convert soy compounds into forms the body can absorb, while soy consumption itself changes the composition and activity of the gut microbiome.

MICROBIOMES4SOY is also investigating how **newly discovered microorganisms from Icelandic hot springs can improve soybean fermentation**. These microorganisms may reduce anti-nutritional factors, **producing a more nutritious and sustainable fish feed**. Researchers will compare this feed with conventional formulations to assess its effects on fish health, growth and gut microbiomes.

What's next?

Results from the dietary trial will help **guide the development of new soy-based foods**.

Researchers will also test fermented soybean feeds in fish to assess their **effects on growth, health, gut microbiomes and overall performance**.

Together, these studies aim to **support healthier people, healthier animals and more sustainable food production**.

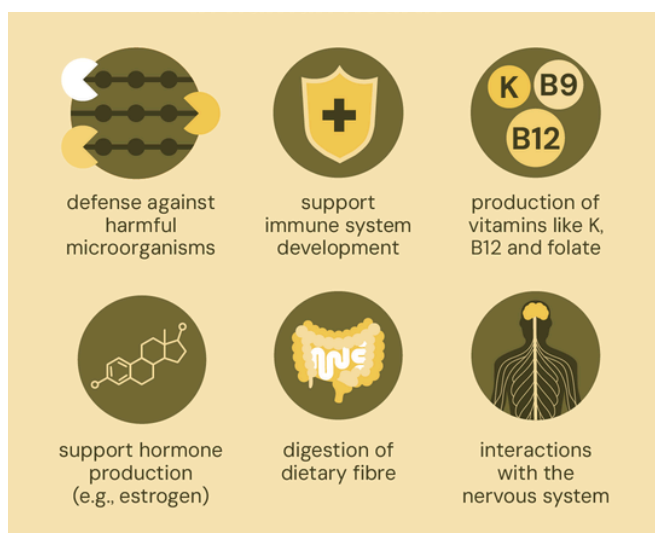


Figure 2: Gut microbiome & health influence

Follow MICROBIOMES4SOY to learn more

Understanding microbiomes across the food chain can help create healthier diets and more sustainable food production. Follow **MICROBIOMES4SOY** to discover how this research is shaping the future of food.



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Sustainable Food Systems Network: SFSN Microbiome Community



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