

what impact does oregano essential oil have on gut flora?

Oregano essential oil reshapes gut flora, tending to reduce pathogens and support barrier function

Main effects on gut microbiota

Most data come from animal feeding studies (pigs, poultry, ruminants, fish, crustaceans); there are no controlled human trials yet.

1. Shift in microbial composition

- **Reduction of potential pathogens:** Oregano essential oil (OEO) often lowers Enterobacteriaceae/E. coli, Shigella, Vibrio, coliforms, and methanogenic archaea in the gut or rumen (Feng et al., 2021; Hall et al., 2021; Trejo-Ramos et al., 2025; Gao et al., 2022; Özel et al., 2021; Kyrtoudis et al., 2025; Kim et al., 2023).
- **Increase in beneficial or fiber-fermenting taxa:** OEO commonly enriches Lactobacillaceae/Lactobacillus, Bifidobacterium, Ruminococcus, Lachnospiraceae, Bacillus, and other butyrate producers, depending on species and gut site (Feng et al., 2021; Hall et al., 2021; Yue et al., 2023; Ruan et al., 2021; Jia et al., 2022; He et al., 2025).
- Diversity and richness often increase or cluster distinctly from controls, indicating a **restructured community** rather than simple broad killing (Feng et al., 2021; Gao et al., 2022; Ruan et al., 2021; Kim et al., 2023).

2. Barrier function, immunity, and metabolites

- OEO improves villus height and tight-junction proteins (occludin, ZO-1, claudin-1), and reduces circulating endotoxin or pro-inflammatory cytokines, suggesting a **stronger intestinal barrier** (Feng et al., 2021; Yue et al., 2023; Ruan et al., 2021; Jia et al., 2022; He et al., 2025; Zou et al., 2016).
- In several species, OEO increases short-chain fatty acids (especially butyrate) or other beneficial microbial metabolites, linking microbiota shifts to improved mucosal health (Yue et al., 2023; Jia et al., 2022; He et al., 2025).

3. Antimicrobial mode of action

- Main components (carvacrol, thymol) disrupt bacterial membranes, causing leakage and death, explaining selective suppression of pathogens at dietary doses (Feng et al., 2021; Yue et al., 2023; Gao et al., 2022; Jia et al., 2022; Zhang et al., 2021; Zou et al., 2016).

Example patterns across models

Model & site	Main microbiota changes with OEO	Citations
Pigs (jejunum–colon, feces)	↓ E. coli/Enterobacteriaceae; ↑ Lactobacillaceae, fiber degraders, butyrate producers	(Hall et al., 2021; Jia et al., 2022; Zou et al., 2016)
Poultry & fish	↓ coliforms, E. coli, Vibrio; ↑ beneficial Actinobacteria, Firmicutes	(Feng et al., 2021; Zhang et al., 2020; Gao et al., 2022; Özel et al., 2021; Ruan et al., 2021)
Ruminants (rumen/colon/cecum)	↓ methanogens; ↑ Bacteroides, Lachnospiraceae, Lactobacillus, Bacillus, SCFA	(Yue et al., 2023; Kyrtoudis et al., 2025; He et al., 2025; Zhang et al., 2021)

FIGURE 1 Summary of oregano oil effects on gut taxa.

Conclusion

Across animal studies, oregano essential oil consistently **modulates gut flora toward fewer pathogens and more barrier-supporting, SCFA-producing bacteria**, with parallel improvements in gut morphology, tight-junction expression, and lower inflammation. Direct evidence in humans is lacking, so any extrapolation to human gut flora should be cautious.

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References

- Feng, J., Lu, M., Wang, J., Zhang, H., Qiu, K., Qi, G., & Wu, S. (2021). Dietary oregano essential oil supplementation improves intestinal functions and alters gut microbiota in late-phase laying hens. *Journal of Animal Science and Biotechnology*, 12. <https://doi.org/10.1186/s40104-021-00600-3>
- Hall, H., Wilkinson, D., & Bon, L. (2021). Oregano essential oil improves piglet health and performance through maternal feeding and is associated with changes in the gut microbiota. *Animal Microbiome*, 3. <https://doi.org/10.1186/s42523-020-00064-2>
- Trejo-Ramos, D., Rodríguez-Arana, C., Cruz-Flores, R., & Hernández-Rodríguez, M. (2025). Effect of Oregano Essential Oil on Growth and Composition of Gut Prokaryote Microbiota on Striped Bass (*Morone saxatilis*). *Microorganisms*, 13. <https://doi.org/10.3390/microorganisms13020264>
- , Y., Shi, J., Jia, L., He, P., Wang, Y., Zhang, X., Huang, Y., Cheng, Q., Zhang, Z., Dai, Y., Xu, M., & Lei, Z. (2023). Oregano essential oil modulates colonic homeostasis and intestinal barrier function in fattening bulls. *Frontiers in Microbiology*, 14. <https://doi.org/10.3389/fmicb.2023.1293160>
- Zhang, R., Wang, X., Liu, L., Cao, Y., & Zhu, H. (2020). Dietary oregano essential oil improved the immune response, activity of digestive enzymes, and intestinal microbiota of the koi carp, *Cyprinus carpio*. *Aquaculture*, 518, 734781. <https://doi.org/10.1016/j.aquaculture.2019.734781>

- Gao, F., Zhang, L., Li, H., Xia, F., Bai, H., Piao, X., Sun, Z., Cui, H., & Shi, L. (2022). Dietary Oregano Essential Oil Supplementation Influences Production Performance and Gut Microbiota in Late-Phase Laying Hens Fed Wheat-Based Diets. *Animals : an Open Access Journal from MDPI*, 12. <https://doi.org/10.3390/ani12213007>
- Özel, O., Çakmak, E., Gürkan, S., Coskun, I., & Türe, M. (2021). Evaluation of oregano (*Origanum vulgare*) essential oil supplementation on growth performance, digestive enzymes, intestinal histomorphology and gut microbiota of Black Sea salmon, *Salmo labrax*. *Annals of Animal Science*, 22, 763 - 772. <https://doi.org/10.2478/aoas-2021-0068>
- Ruan, D., Fan, Q., Fouad, A., Sun, Y., Huang, S., Wu, A., Lin, C., Kuang, Z., Zhang, C., & Jiang, S. (2021). Effects of dietary oregano essential oil supplementation on growth performance, intestinal antioxidative capacity, immunity, and intestinal microbiota in yellow-feathered chickens.. *Journal of animal science*, 99 2. <https://doi.org/10.1093/jas/skab033>
- Kyrtsoudis, D., Alvanou, M., Loukovitis, D., Gourdouvelis, D., Bampidis, V., Chatziplis, D., & Mitsopoulos, I. (2025). Influence of Oregano Essential Oil on the Rumen Microbiome of Organically Reared Alpine Goats: Implications for Methanobacteria Abundance. *Animals : an Open Access Journal from MDPI*, 15. <https://doi.org/10.3390/ani15131937>
- Jia, L., Wu, J., Lei, Y., Kong, F., Zhang, R., Sun, J., Wang, L., Li, Z., Shi, J., Wang, Y., Wei, Y., Zhang, K., & Lei, Z. (2022). Oregano Essential Oils Mediated Intestinal Microbiota and Metabolites and Improved Growth Performance and Intestinal Barrier Function in Sheep. *Frontiers in Immunology*, 13. <https://doi.org/10.3389/fimmu.2022.908015>
- He, P., Lei, Y., Zhang, R., Shi, J., Cheng, Q., , Y., Ran, T., & Lei, Z. (2025). Dietary oregano essential oil supplementation improves intestinal barrier function and modulates the cecal microbiota and metabolites of beef cattle. *Chemical and Biological Technologies in Agriculture*, 12. <https://doi.org/10.1186/s40538-025-00858-z>
- Zhang, R., Wu, J., Lei, Y., Bai, Y., Jia, L., Li, Z., Liu, T., Xu, Y., Sun, J., Wang, Y., Zhang, K., & Lei, Z. (2021). Oregano Essential Oils Promote Rumen Digestive Ability by Modulating Epithelial Development and Microbiota Composition in Beef Cattle. *Frontiers in Nutrition*, 8. <https://doi.org/10.3389/fnut.2021.722557>
- Kim, H., Kim, H., Yun, Y., & Kang, H. (2023). Effect of *Bacillus subtilis* and Oregano Oil on Performance, Gut Microbiome, and Intestinal Morphology in Pullets. *Animals : an Open Access Journal from MDPI*, 13. <https://doi.org/10.3390/ani13162550>
- Zou, Y., Xiang, Q., Wang, J., Peng, J., & Wei, H. (2016). Oregano Essential Oil Improves Intestinal Morphology and Expression of Tight Junction Proteins Associated with Modulation of Selected Intestinal Bacteria and Immune Status in a Pig Model. *BioMed Research International*, 2016. <https://doi.org/10.1155/2016/5436738>