



# Food Emulsifiers & the Gut Microbiome — Quick Guide

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## Quick takeaways

- Evidence strongest in humans for Carboxymethylcellulose (CMC; E466) and in multiple models for Polysorbate-80 (P80; E433).
- Other emulsifiers/stabilizers show signals in animal, in-vitro, or ex-vivo models—effects vary by dose, food matrix, and individual microbiome.
- Choosing fewer ultra-processed foods naturally lowers exposure.

## Emulsifiers at a glance

| Category                                       | Emulsifier (E-number)  | Commonly found in                             |
|--|--|---|
| Strongest human/animal evidence                | Carboxymethylcellulose (E466)  | Ice cream, dressings, sauces, baked goods     |
|  | Polysorbate-80 (E433)  | Ice cream, desserts, sauces, baked goods      |
| Signals from animal/ex-vivo studies            | Carrageenan (E407)   | Plant milks, deli meats, desserts             |
|  | Sodium stearoyl lactylate (E481)   | Breads, baked goods                           |
|  | Mono- & diglycerides (E471)  | Breads, baked goods, spreads                  |
|  | DATEM (E472e)  | Breads, baked goods                           |
|  | Sucrose fatty acid esters (E473)   | Confections, beverages                        |
|  | Propylene glycol alginate (E405)   | Dairy drinks, dressings                       |
|  | Sorbitan monostearate (E491)   | Baked goods, confectionery                    |
|  | Hydroxypropyl methylcellulose (E464)   | Gluten-free products, sauces                  |
| Variable effects (dose & microbiome dependent) | Gums/hydrocolloids e.g., Xanthan (E415), Guar (E412), Locust bean (E410), Gum arabic (E414), Agar (E406) | Gluten-free products, sauces, frozen desserts |
| Generally minimal impact in screens            | Lecithin (E322; soy/sunflower)   | Chocolate, nut butters, dressings             |



### **Label checklist**

- Scan ingredient lists for E-numbers above or names like carboxymethylcellulose, polysorbate-80, carrageenan, mono- & diglycerides, DATEM.
- Prefer products with simpler emulsifiers (e.g., lecithin) or none at all.
- Matrix matters — yogurt or whole-food sauces tend to need fewer stabilizers than shelf-stable ultra-processed items.

### **Note on whey protein**

Whey protein is an ingredient that can function as an emulsifier because its proteins (e.g.,  $\beta$ -lactoglobulin) stabilize oil-in-water mixtures. However, it isn't classified as a separate additive with an E-number like the emulsifiers above. On labels you'll see it listed simply as "whey protein," not as an emulsifier additive.