

Preventative Allergen Labelling – Shellfish and Fish Allergens in Seaweed Products

Main reference: [Mildenberger et al., 2024](#)

The VITAL® (Voluntary Incidental Trace Allergen Labelling Program – [Allergen Bureau 2023](#)) approach was developed over time to establish a program of risk-based precautionary allergen labelling (PAL). The latest update of this program adopted the eliciting dose (ED) ED₀₁ as reference dose (RfD). The ED is derived from a stacked model averaging program for each of the 14 European Union food allergens. ED₀₁ corresponds to the **amount of total protein** from an allergenic food below which only 1% of the allergic population would react with objective allergic symptoms.

The VITAL 3.0 panel recommends 25 mg of shrimp protein and 1.3 mg of finfish protein as RfDs for crustaceans and fish, respectively. Generally, mollusc and crustacean allergies are easily confused and are often commonly described as shellfish allergy ([Rolland et al. 2018](#)). **The exposure to allergenic protein in a certain food product depends further on a reference amount (RfA), which is the maximum amount of food eaten on a typical eating occasion.** To define the labelling decision for packaged foods, Action Levels (AL) have been defined. AL 1: a low concentration of the evaluated allergen with a low risk for adverse reaction and does not recommend PAL.

Table 4 Factors and formulas used for conversion between assay targets and organism protein. Completed with values from a: Demeditec Diagnostics GmbH; b: (Akonor et al. 2016); c: (Merdzhanova et al. 2016) and (Tabakaeva et al. 2018); d: (U.S. Department of Agriculture 2019). e: not relevant for calculation

	Crustacean	Mollusk	Fish
VITAL 3 RfD (organism protein, mg)	25	N/A	1.3
Conversion factor (CF) ELISA assay^a	34	14990	N/A
Protein content of organism (%)	20 ^b	15 ^c	20 ^d
Dry weight (DW) (%)	25 ^b	e	e
Formula: assay target to organism protein	Tpm*CF(34) *4(WW) *0.2 (prot)	Tpm*CF (14990) *0.15 (prot)	Cod eq*0.2 (prot)
Factor: assay target to organism protein	27.2	2248.5	0.2

To be on the safe side, the authors estimated that a RfA of 3 g dried seaweed is over the quantity of what can be expected to be ingested as one portion. **For a direct evaluation of ELISA results, AL 1 transition points can also be expressed as the amount of allergen, which is 306.4 ppm crustacean tropomyosin and 2165 ppm cod for a 3 g serving of seaweed to be at risk.**

	3 g seaweed	5 g seaweed
Allergen	Threshold dose (ppm)	Threshold dose (ppm)
Shellfish	300	175
Fish	2000	1200

In recent samples collected in Alaska, the highest crustacean value measured was 300 ppb, or ~1000x less than the proposed AL transition point.

