

EcoBind™ CR-DeMud System

by INTABIOTECH

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GEOSMIN 2 · ORGANOLEPTIC CONTROL

The **EcoBind™ CR-DeMud** system addresses the defects of **mud/faeces/corn in crustaceans** for what they really are: a technological quality problem that demands a technical solution, not a cosmetic one. In shrimp, these defects have distinct causes – bioaccumulation of geosmin and 2-MIB from the farming water, residual intestinal content, lipid oxidation and process metabolites – and each cause determines which product may work and which promises are technically sustainable for the customer, the market and consumers, as well as for the regulator.

An alkaline wash can remove mucilage, faeces, surface amines and process notes, but if the defect is bioaccumulated in the tissue, it is essential to combine plant treatment with depuration in clean water and analytical control. This technical documentation presents the system in two phases, the industrial application protocol and the regulatory considerations applicable to the EU/Spain market.

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Technological Diagnosis: The Three Defects in Shrimp

Correct identification of the organoleptic defect is the first step before selecting any treatment. The three most frequent problematic sensory profiles in shrimp – mud/earth, faecal/excrement and corn/feed – have different origins, and that difference critically determines both the expected effectiveness of the treatment and the real limitations that must be communicated to the industrial customer.

1

Mud / Earth / Mould

Probable cause: Geosmin and 2-methylisoborneol (2-MIB), associated with cyanobacteria and actinomycetes in culture water.

Can it be corrected with product? Partially if it is on the surface. Difficult if it is bioaccumulated in muscle tissue. The real solution requires purging in clean water and pond control at source.

2

Excrement / Faecal / Intestinal

Probable cause: Intestinal content, poor purging, deficient hygienic handling, or microbial degradation.

Can it be corrected with product? Only if it is superficial or intestinal and there is no active decomposition. If there is genuine deterioration, the batch must be rejected. It should not be masked.

3

Maize / Feed / Cereal

Probable cause: Feed profile, lipid oxidation, culture metabolites and carry-over of compounds from the hepatopancreas.

Can it be corrected with product? Reducible through washing, purging, antioxidation and process control. Treatment in the plant can have a significant impact if the origin is not deep bioaccumulation.

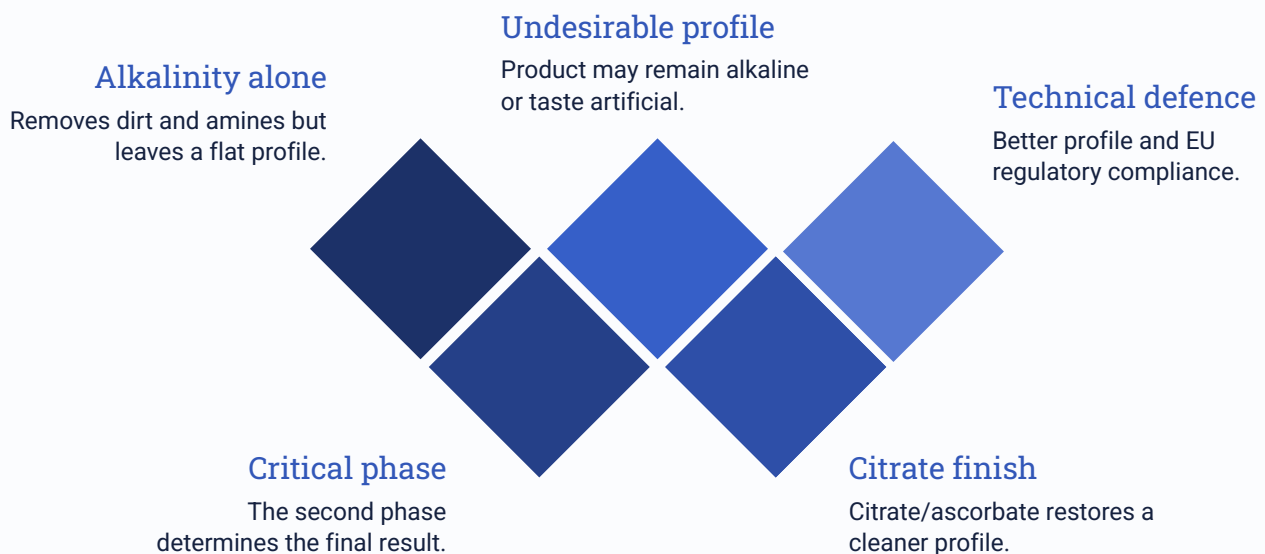
i The scientific literature identifies geosmin and 2-MIB as typical causes of "earthy/muddy/musty" flavours in aquaculture products, with direct transfer from the water to the animal. They are not necessarily toxic, but they severely affect sensory acceptance. Indole is used as an indicator of quality and decomposition in shrimp: its elevated presence signals deterioration, not just an organoleptic defect.

System Architecture: Two Complementary Phases

The EcoBind™ CR-DeMud system is designed as a sequential treatment in two cold baths. Each phase has a specific and differentiated technological function. The combination of both delivers superior sensory results to either one alone, as verified in the pilot trial with four comparative treatments.



The second phase is critical to the final result. If only alkalinity is applied, dirt and amines are removed, but the product may be left with a flat, alkaline or artificial profile. The citrate/ascorbate finish restores a cleaner sensory profile and is technically more defensible from a regulatory point of view in the EU.



Product Formulation: Technology Bases

EcoBind™ CR-DeMud ALK – Alkaline Phase

Technological washing aid. Acts on the surface of the shrimp to remove superficial organic compounds, mucilage and amines.

- Food-grade sodium bicarbonate (main functional base)
- Potassium carbonate/bicarbonate in low proportion
- Food-grade sodium chloride
- Sodium/potassium citrate as ionic strength regulator
- Compatible antioxidant (ascorbate) if the process allows it
- Minimal anti-caking agent if formulated as a powder

Target bath pH: 8.2–8.8 · Temperature:
0–4 °C

SeaDex™ CR-CIT Finish – Corrective Phase

Final citrate-ascorbate bath. Legally more convenient in the EU because citrates and ascorbates are authorised in unprocessed crustaceans at *quantum satis* (Regulation 1333/2008, category 09.1.2).

- Citric acid
- Citrates: sodium and potassium
- Sodium ascorbate or ascorbic acid
- Food-grade salt
- Optionally a very low fraction of validated natural antioxidant (without its own flavour)

Target bath pH: 6.2–6.8 · Temperature:
0–4 °C

⚠ We do not use other ingredients such as β -cyclodextrin (E459) as a residual ingredient in shrimp for the EU. Its use is limited to specific categories. It may be studied in a closed extraction process, but not as a residual component.

- ✔ **EcoBind™ CR-DeMud system summary:** Two products. Two cold baths. One validated protocol. Objective reduction of unwanted notes of mud, gut, feed, amines and process, without aromas, without masking and with a regulatory positioning that is defensible in the EU/Spain.



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Citrate-ascorbate finishing bath

Alkaline washing bath

Citrate-ascorbate finishing bath

Citrate

179

Corff Ltd

Species	Sex	Date	Notes
			
			
			

Operating Bath Parameters: Dosage, Times and Controls

Correct application of the system requires respecting the operating ranges of each phase. Exceeding the limits of pH, temperature or contact time does not improve the result; instead, it increases the risk of artificial texture, loss of sensory identity, protein alteration and regulatory issues if a technological effect remains in the final product.

Bath 1

EcoBind™ CR-DeMud ALK

Parameter	Operating value
Bath dosage	0.8–1.2 kg per 100 L
Temperature	0–4 °C
Target pH	8.2–8.8
Contact time	5–10 min (max. 10 min)
Shellfish/bath ratio	Minimum 1:2 · Ideal 1:3
Agitation	Gentle, not vigorous
Post-rinse	Mandatory, cold water

Bath 2

SeaDex™ CR-CIT Finish

Parameter	Operating value
Bath dosage	0.3–0.6 kg per 100 L
Temperature	0–4 °C
Target pH	6.2–6.8
Contact time	3–6 min (max. 6 min)
Shellfish/bath ratio	Minimum 1:2
Final draining	Mandatory before glazing/freezing
Destination	Glazing, IQF, block or packaging

- ❏ Practical scale example: to treat **100 kg of shellfish**, prepare 200–300 L of ALK bath with 2.0–3.6 kg of EcoBind™ CR-DeMud ALK. If pH exceeds 9.0 or the time is maintained above 15 minutes, the risk of soapy texture, excess water retention and regulatory declaration issues increases significantly.

Industrial Protocol by Product Format

The effectiveness of the system varies according to the format of shrimp treated. Peeled product or peeled tail product offers the best results because the bath contacts the muscle directly and the intestinal load is removed more effectively. Whole shrimp with head presents greater difficulty for defects of internal origin.

Peeled shrimp / peeled tail

Most effective protocol.

Maximum contact with muscle.

1. Initial wash: cold water
0–4 °C, 1–2 min
2. EcoBind™ ALK bath: 1,0 %, 5–8 min, pH 8,2–8,8
3. Rinse: cold water, 30–60 s
4. SeaDex™ CIT bath: 0,4–0,5 %, 3–5 min, pH 6,2–6,8
5. Draining: 2–5 min
6. Freezing/glazing according to the usual process

Result: Good reduction of superficial, faecal, alkaline/ammoniac notes, and part of the earthy note if it is not highly bioaccumulated.

Whole shrimp with head

Prudent protocol. Shell limits internal action.

1. Initial wash: abundant cold water
2. EcoBind™ ALK: 0,8–1,0 %, 8–10 min
3. Rinse: necessary
4. SeaDex™ CIT: 0,4–0,6 %, 4–6 min
5. Long draining to avoid excess bath in the head

Warning: If the defect comes from the hepatopancreas, head or intestine, the treatment improves external odour but does not completely eliminate the internal defect.

Frozen shrimp to reprocess

Only if reprocessing is permitted by the client's quality and traceability system.

1. Controlled thawing 0–4 °C
2. Full drainage
3. EcoBind™ ALK 0,8 %, 5 min
4. Rinse
5. SeaDex™ CIT 0,4 %, 3 min
6. Draining and rapid refreezing


Limitation: Do not apply long treatments to thawed product: this increases exudate and the risk of soft texture.

Optimum moment for application: At source, before freezing, is the ideal application. The shrimp arrives fresh or refrigerated, is washed, treated and frozen. Application in the processing plant after thawing is possible but less efficient.

Mandatory Controls in the Plant and Batch Sheet

Do not apply the system “by eye”. It is essential to have a batch control sheet with the critical parameters recorded. The effectiveness of any wash degrades progressively as the bath accumulates organic matter: turbidity, increased organic load and a change in smell are clear signs that the bath must be renewed. The FAO explicitly warns that organic matter reduces the effectiveness of hygiene systems in fishery products.

Control parameter	Operating limit	Action if not met
Bath temperature	0–4 °C	Add ice or stop the process
EcoBind™ ALK pH	8.2–8.8	Adjust dose or renew bath
SeaDex™ CIT pH	6.2–6.8	Adjust dose or renew bath
Maximum ALK time	10 min	Time it; do not exceed
Maximum CIT time	6 min	Time it; do not exceed
Bath/product ratio	Minimum 2:1	Increase bath volume
Bath renewal	When organic load, turbidity or odour rises	Renew immediately
Final shrimp pH	Approx. 6.8–7.6	Review process and times
Final odour	Clean marine, with no alkaline note	Review rinsing and CIT stage
Final texture	Firm, not soapy, not rubbery	Review ALK pH and time

 The accumulated bath should not be used indefinitely. When visible turbidity, a change in smell or an increase in organic load is observed, it must be completely renewed. A bath saturated with organic matter not only loses effectiveness: it may redeposit contaminants on the product.



Gomins

Item	Unit	Quantity	Price	Total
Carbón activo	kg	100	1.200	120.000
Carbón vegetal	kg	100	1.500	150.000
Carbón	kg	100	1.800	180.000
Carbón	kg	100	2.100	210.000
Carbón	kg	100	2.400	240.000
Carbón	kg	100	2.700	270.000
Carbón	kg	100	3.000	300.000
Carbón	kg	100	3.300	330.000
Carbón	kg	100	3.600	360.000
Carbón	kg	100	3.900	390.000
Carbón	kg	100	4.200	420.000
Carbón	kg	100	4.500	450.000
Carbón	kg	100	4.800	480.000
Carbón	kg	100	5.100	510.000
Carbón	kg	100	5.400	540.000
Carbón	kg	100	5.700	570.000
Carbón	kg	100	6.000	600.000
Carbón	kg	100	6.300	630.000
Carbón	kg	100	6.600	660.000
Carbón	kg	100	6.900	690.000
Carbón	kg	100	7.200	720.000
Carbón	kg	100	7.500	750.000
Carbón	kg	100	7.800	780.000
Carbón	kg	100	8.100	810.000
Carbón	kg	100	8.400	840.000
Carbón	kg	100	8.700	870.000
Carbón	kg	100	9.000	900.000
Carbón	kg	100	9.300	930.000
Carbón	kg	100	9.600	960.000
Carbón	kg	100	9.900	990.000
Carbón	kg	100	10.200	1.020.000
Carbón	kg	100	10.500	1.050.000
Carbón	kg	100	10.800	1.080.000
Carbón	kg	100	11.100	1.110.000
Carbón	kg	100	11.400	1.140.000
Carbón	kg	100	11.700	1.170.000
Carbón	kg	100	12.000	1.200.000
Carbón	kg	100	12.300	1.230.000
Carbón	kg	100	12.600	1.260.000
Carbón	kg	100	12.900	1.290.000
Carbón	kg	100	13.200	1.320.000
Carbón	kg	100	13.500	1.350.000
Carbón	kg	100	13.800	1.380.000
Carbón	kg	100	14.100	1.410.000
Carbón	kg	100	14.400	1.440.000
Carbón	kg	100	14.700	1.470.000
Carbón	kg	100	15.000	1.500.000
Carbón	kg	100	15.300	1.530.000
Carbón	kg	100	15.600	1.560.000
Carbón	kg	100	15.900	1.590.000
Carbón	kg	100	16.200	1.620.000
Carbón	kg	100	16.500	1.650.000
Carbón	kg	100	16.800	1.680.000
Carbón	kg	100	17.100	1.710.000
Carbón	kg	100	17.400	1.740.000
Carbón	kg	100	17.700	1.770.000
Carbón	kg	100	18.000	1.800.000
Carbón	kg	100	18.300	1.830.000
Carbón	kg	100	18.600	1.860.000
Carbón	kg	100	18.900	1.890.000
Carbón	kg	100	19.200	1.920.000
Carbón	kg	100	19.500	1.950.000
Carbón	kg	100	19.800	1.980.000
Carbón	kg	100	20.100	2.010.000
Carbón	kg	100	20.400	2.040.000
Carbón	kg	100	20.700	2.070.000
Carbón	kg	100	21.000	2.100.000
Carbón	kg	100	21.300	2.130.000
Carbón	kg	100	21.600	2.160.000
Carbón	kg	100	21.900	2.190.000
Carbón	kg	100	22.200	2.220.000
Carbón	kg	100	22.500	2.250.000
Carbón	kg	100	22.800	2.280.000
Carbón	kg	100	23.100	2.310.000
Carbón	kg	100	23.400	2.340.000
Carbón	kg	100	23.700	2.370.000
Carbón	kg	100	24.000	2.400.000
Carbón	kg	100	24.300	2.430.000
Carbón	kg	100	24.600	2.460.000
Carbón	kg	100	24.900	2.490.000
Carbón	kg	100	25.200	2.520.000
Carbón	kg	100	25.500	2.550.000
Carbón	kg	100	25.800	2.580.000
Carbón	kg	100	26.100	2.610.000
Carbón	kg	100	26.400	2.640.000
Carbón	kg	100	26.700	2.670.000
Carbón	kg	100	27.000	2.700.000
Carbón	kg	100	27.300	2.730.000
Carbón	kg	100	27.600	2.760.000
Carbón	kg	100	27.900	2.790.000
Carbón	kg	100	28.200	2.820.000
Carbón	kg	100	28.500	2.850.000
Carbón	kg	100	28.800	2.880.000
Carbón	kg	100	29.100	2.910.000
Carbón	kg	100	29.400	2.940.000
Carbón	kg	100	29.700	2.970.000
Carbón	kg	100	30.000	3.000.000



Pilot Trial: Recommended Design and Measurements

Before implementing the system or scaling to production, it is essential to carry out a controlled pilot trial with four comparative treatments. This trial makes it possible to demonstrate objectively the differential effectiveness of the complete system against partial treatments and against the control, and provides the analytical and sensory basis for regulatory and commercial validation of the product with end customers.

1

Batch A – Control

Cold water + salt. No active treatment. Baseline reference for all sensory and analytical comparisons.

2

Batch B – SeaDex™ CIT only

Citrate/ascorbate bath only. Allows assessment of the exclusive contribution of the corrective phase without a prior alkaline wash.

3

Batch C – EcoBind™ ALK + rinse only

Alkaline phase without final correction. Allows assessment of the effect of the alkaline wash and its impact on texture and residual sensory profile.

4

Batch D – Complete system

EcoBind™ ALK + rinse + SeaDex™ CIT. Complete two-phase treatment. Expected result: better sensory profile with a lower residual alkaline note.

Measurements per batch

Sensory analysis (trained panel):

- Mud/earth odour
- Faecal/gut odour
- Maize/feed flavour
- Ammoniacal note
- Natural sweetness of the shrimp
- Texture and elasticity
- Colour

Physicochemical parameters:

- Bath pH and final shrimp pH
- Moisture and water retention
- Residual sodium/potassium
- Drip loss

Microbiological analysis:

- Total aerobes
- Enterobacteriaceae
- Vibrio spp. if applicable

Deterioration indicators:

- Indole (indicator of spoilage in shrimp)
- TVB-N / TMA-N if the laboratory has them available

Analysis of mud compounds (if the main defect is "earth/mud"):

- Geosmin by GC-MS/SPME
- 2-methylisoborneol (2-MIB) by GC-MS/SPME

Technical and Commercial Limits

As important as knowing how to apply the system correctly is understanding its limits and the practices that must be avoided. These restrictions are not optional: they define the technical integrity of the product, regulatory safety and commercial credibility with the industrial customer.

✗ KNAMAX™ applied directly at high pH to finished shrimp

Technically aggressive. Real risk of soapy texture, loss of sensory identity, protein alteration and regulatory issues if there is any residual technological effect. There is no technical justification for raising to pH 11–13 in direct contact with finished product.

✗ Carbonates without a subsequent rinse

Direct risk of residual alkaline taste, artificial texture and a regulatory declaration issue in the EU. Rinsing is not optional: it is a necessary condition for the alkaline phase to be defended as a technological aid without residual function.

✗ Using aromas to mask the defect

Commercially risky and technically unsound. The industrial customer will detect the added note; so will the consumer. In highly demanding sensory markets, masking a defect with aroma is a positioning error that destroys credibility.

✗ Treating deteriorated batches

If there is real spoilage – high indole, elevated TVB-N/TMA-N or unacceptable microbial load – the batch should be rejected. No attempt should be made to "recover" deteriorated product with any washing system. This is both a technical and legal responsibility.

✗ Promising total removal of bioaccumulated geosmin/2-MIB

If geosmin or 2-MIB are bioaccumulated in the muscle from the culture water, the bath may reduce the surface perception but will not eliminate the defect. The real solution is at source: purging in clean water, pond control, geosmin/2-MIB analysis and rejection of severely affected batches.

Regulatory Fit EU/Spain: Legal Positioning of the System

Regulatory positioning is one of the most critical aspects of a system and must be handled with precision. In category 09.1.2 (unprocessed molluscs and crustaceans) of Regulation EC 1333/2008, the authorised additives include sulphites, ascorbic acid/ascorbates, citric acid/citrates, phosphates under specific conditions, calcium disodium EDTA in frozen products, and 4-hexylresorcinol. However, sodium and potassium carbonates (E500/E501) appear authorised in that category only for frozen/deep-frozen cephalopods, not as a general authorisation for shrimp. The manufacturer positioning is as follows

SeaDex™ CR-CIT Finish – Comfortable position

Formulated with citric acid, citrates and ascorbates: substances expressly covered in unprocessed crustaceans and molluscs under category 09.1.2 of Regulation 1333/2008 at *quantum satis*.

This means it can be defended as an **authorised additive in the finished product**, provided the doses and process are documented and validated.

EcoBind™ CR-DeMud ALK – Technological aid

It must be defended exclusively as a **technological aid for washing**, not as an additive in the finished product. Regulation 1333/2008 excludes technological aids from its scope unless they are used as additives.

Essential conditions:

- Mandatory post-rinse
- No residual technological function in the finished product
- Analytical documentation: sodium/potassium residue, final pH, absence of residual preserving or texturising effect
- Where appropriate, a specific regulatory opinion should be requested for the target market

⊗ β-cyclodextrin (E459) should not be used as a residual ingredient in shrimp for the EU. It may be considered as extraction technology in a closed process, but never as a residual component in shrimp without specific and prior legal review.



Commercial Protocol and Dosing

The EcoBind™ CR-DeMud system is marketed as a **complete technological protocol for shrimp**, not as an aroma or a masking agent. The correct positioning defines both the value proposition and the technical credibility before the industrial customer.

iNTABIOTECH SL markets it as a **washing and organoleptic correction system designed to reduce undesirable notes of superficial, intestinal, ammoniacal, earthy or process-derived origin, within a validated protocol of depuration, cold washing and sensory control.**

1 %

Initial ALK dose

1 kg of EcoBind™ CR-DeMud ALK per 100 L bath.
Reference dose for industrial trial.

0,5 %

Initial CIT dose

0.5 kg of SeaDex™ CR-CIT Finish per 100 L bath.
Final corrective phase.

20–30 kg

ALK per tonne

For 1,000 kg of shrimp with a 2,000–3,000 L bath.
Trial dose at industrial scale.

10–15 kg

CIT per tonne

For 1,000 kg of shrimp. Adjust after the trial according to defect intensity and sensory result.



The initial sales dose is a reference for the pilot trial. After the test, it is adjusted according to the intensity of the defect, the shrimp format, the contact time available in the plant and the sensory result obtained. The system must always be accompanied by a depuration protocol and source water control, especially when the mud defect comes from bioaccumulated geosmin/2-MIB: no plant treatment can replace purging in clean water, pond control and the selection and rejection of severe lots at source.

Commercial Contact – INTABIOTECH SL

EcoBind™ CR-DeMud is commercialised by INTABIOTECH SL. Our technical-commercial team is available to support you from the pilot trial through to industrial implementation.



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