



LIVE ALGAE Replacement - Substitute

Artemia/Rotifer Enrichment Media

Direct Feed

Formula Ingredient

Nutrient-rich technologies for improving survival, disease resistance, growth and development in crustacea, finfish, and molluscs through hygienically safe, cost effective diets with superior levels of DHA.

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BIO-MARINE, INC.
Aquafauna

Moving aquaculture into the 21st century

ALGAMAC-2000™

ALGAMAC 3050™ flake Schizochytrium Plus™

Algamac-2000 consists of spray-dried cells of SCHIZOCHYTRIUM sp. heterotrophically grown in a sterile environment.

Algamac-3050 is pure schizochytrium algae, drum dried and presented in flake form.

Uses: (2000 & 3050)

- ▶ Rotifer & Artemia Enrichment
- ▶ Live Algae Replacement
- ▶ Live Algae Substitute
- ▶ Direct Feeding
- ▶ Formula Ingredient

Features: (2000 & 3050)

- ▶ Sound nutritional profile.
- ▶ High percentage of lipids.
- ▶ Extremely high levels of DHA (22:6w3).
- ▶ Good buoyancy characteristics.
- ▶ Simple to use.

Benefits:

- ▶ **Increased Growth & Survival Rates.** Nutritionally balanced with amino acids, vitamins & minerals, ALGAMAC-2000/3050 can be used as a live algae replacement/substitute, Rotifer or Artemia enrichment, direct feed or formula ingredient insuring healthier animals with increased disease resistance.
- ▶ **Significant Reduction in Live Algae Costs.** Partially substitute ALGAMAC-2000/3050 for live algae and save up to 80% (Considering reduced labor and overhead requirements for live algae production).

- ▶ **Highest in Omega-3 (DHA).** With outstanding fatty acid profiles, ALGAMAC-2000 (27% DHA) and ALGAMAC-3050 (43% DHA), both offer unparalleled energy levels critical to larvae and post-larvae growth and metamorphosis.

- ▶ **Easy To Use.** No messy oils. ALGAMAC-2000/3050 is dry and simple to use.
 - ALGAMAC-2000 are spray dried cells in powder form displaying high stability in suspension and maintains excellent water quality characteristics.
 - ALGAMAC-3050 is a dry, flaked particle which emulsifies readily in water.



2.5 x 10⁹
cells per gram

Algamac-2000 - Packed in 500 gram (6kg / case) vacuum foil bags to preserve freshness



2.5 x 10⁹
cells per gram

Algamac-3050 - Coarse Flake Particle (1.5mm) Packed in 800 gram (8kg /case) vacuum foil bags to preserve freshness

-2000



Feeding Protocols



-3050

DIRECT FEEDING

1. Hydrate ALGAMAC-2000 in freshwater in a sealed container. Up to 20 grams of dry product per liter may be emulsified. NOTE: Refer to ratio of application below.
2. Manually agitate the sealed container. The ALGAMAC-2000 solution is ready for use per your established larval feeding schedule.

Ratio of Application:

4-5 grams per ton of water twice each day. ALGAMAC-2000 prepared by this method will maintain particle sizes in the range of 10-80 microns.

ENRICHMENT PREPARATION

1. Hydrate dry ALGAMAC-2000 powder in fresh or saltwater (preferably fresh) and mix in a blender for one minute. Up to 30 grams of dry product per liter may be emulsified.
2. Strain off any excess surface foam. The mixture is now ready for use as indicated below.

ALGAMAC-2000 prepared by this procedure will produce particle sizes of under 10 microns.



ARTEMIA ENRICHMENT

Transfer newly hatched Artemia nauplii to an enrichment tank with **clean, filtered** seawater. Maximum density of Artemia should not exceed 100,000 nauplii per liter of water. Add the prepared ALGAMAC-2000 mixture to the enrichment tank at a rate of 0.2 grams per liter (per 100,000 nauplii). Aerate enrichment tank vigorously so that oxygen levels exceed 4ppm during the 12 hours of enrichment. Harvest the enriched Artemia nauplii after 12 hours. If higher levels of DHA are desired, repeat enrichment process by adding another 0.2 grams per liter for an additional 12 hours.

Ratio of Application: 0.2 grams/liter/12 hours/ 100,000 Artemia nauplii

ROTIFER ENRICHMENT

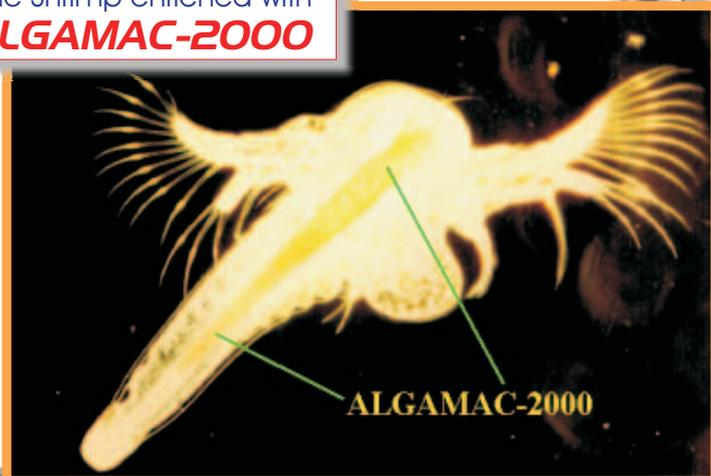
Transfer harvested rotifers to an enrichment tank with **clean, filtered** seawater. Maximum density of rotifers should not exceed 500,000 rotifers per liter of seawater. Add the prepared ALGAMAC-2000 mixture to the enrichment tank at a rate of 300 mg per 1,000,000 rotifers. Aerate vigorously so that oxygen levels exceed 4.0 ppm during the 12 hours of enrichment. If higher levels of DHA are desired, repeat enrichment process by adding another 300 mg ALGAMAC-2000 per 1,000,000 rotifers for an additional 12 hours.

Ratio of Application: 300 mg ALGAMAC-2000 per 1,000,000 rotifers.



**When using ALGAMAC-2000 as a direct larval diet, or an algae replacement, the use of a blender is not required.*

Brine Shrimp enriched with
ALGAMAC-2000



DIRECT FEEDING

1. Mix measured amount of ALGAMAC-3050 with either fresh or seawater in an electric blender for 1-2 minutes or until completely emulsified. Flake particles will break down into individual cells (6-8 microns). When blending is complete, strain through sub 80-micron mesh to eliminate any foam.

Ratio of Application:

0.2 grams / liter / 100,000 nauplii / 12 hour enrichment period

ENRICHMENT PREPARATION

1. Mix measured amount of ALGAMAC-3050 with either fresh or seawater in an electric blender for 1-2 minutes or until completely emulsified. Flake particles will break down into individual cells (6-8 microns). When blending is complete, strain through sub 80-micron mesh to eliminate any foam.



ARTEMIA ENRICHMENT

Transfer newly hatched Artemia nauplii to an enrichment tank with **clean, filtered** seawater. Maximum density of Artemia should not exceed 100,000 nauplii per liter of water. Add the prepared ALGAMAC-3050 mixture to the enrichment tank at a rate of 0.2 grams per liter (per 100,000 nauplii). Aerate enrichment tank vigorously so that oxygen levels exceed 4ppm during the 12 hours of enrichment. Harvest the enriched Artemia nauplii after 12 hours. If higher levels of DHA are desired, repeat enrichment process by adding another 0.2 grams per liter for an additional 12 hours.

Ratio of Application: 0.2 grams/liter/12 hours/ 100,000 Artemia nauplii

ROTIFER ENRICHMENT

Transfer harvested rotifers to an enrichment tank with **clean, filtered** seawater. Maximum density of rotifers should not exceed 500,000 rotifers per liter of seawater. Add the prepared ALGAMAC-3050 mixture to the enrichment tank at a rate of 300 mg per 1,000,000 rotifers. Aerate vigorously so that oxygen levels exceed 4.0 ppm during the 12 hours of enrichment. If higher levels of DHA are desired, repeat enrichment process by adding another 300 mg ALGAMAC-3050 per 1,000,000 rotifers for an additional 12 hours.

Ratio of Application: 300 mg ALGAMAC-3050 per 1,000,000 rotifers.



**Both the Algamac-2000 and Algamac-3050 have high efficiencies for Artemia and Rotifer enrichment in warm water conditions. Algamac-3050 has the added advantage of more than twice the DHA (by Dry wt.) which allows manipulation of the DHA to EPA ratio.*

Storage Conditions: (2000 & 3050)

- ▶ **Short/Medium: (up to 6 months) - best if kept under 24 degrees C.**
- ▶ **Long Term: (over 6 months) - best to freeze.**

It is well documented that DHA rich fatty acids are required for proper larval development. Fish oils may exhibit higher EPA levels than ALGAMAC-2000, however, through the process of retroconversion, most marine organisms can produce sufficient levels of EPA from DHA. Conversely, many types of marine animals are incapable of elongating EPA into DHA resulting in a DHA deficiency unless provided with a DHA rich diet (ie: ALGAMAC-2000).

** See "Nutritional Enhancement of n-3 and n-6 Fatty Acids in Rotifers and Artemia nauplii by Feeding Spray-dried Schizochytrium sp."
- William Barclay and Sam Zeller.



Profiles

Proximate Analysis

Concentration
(% weight)

Protein	20.2
Fat	38.1
Carbohydrate (by subtraction)	17.1
Ash	20.4
Moisture	4.2
Calories (C/100g)	492.0

Sterols & Other

Beta-Sitosterol (mg/100g)	45.1
Campesterol (mg/100g)	82.4
Cholesterol (mg/100g)	213.0
Stigmasterol (mg/100g)	225.0

Other

Lecithin (mg/100g)	392
Lutein (mg/100g)	<.12

Proximate Analysis

Concentration
(% weight)

Protein	17.6
Fat	56.2
Carbohydrate (by subtraction)	15.9
Ash	8.2
Moisture	2.1
Calories (C/100g)	640.0

Sterols & Other

Beta-Sitosterol (mg/100g)	19.7
Campesterol (mg/100g)	10.6
Cholesterol (mg/100g)	178.0
Stigmasterol (mg/100g)	154.0

Other

Lecithin (mg/100g)	258
Lutein (mg/100g)	<.12

Fatty Acid Profile

Fatty acid content (%w/w)

Fatty Acid	Name	%TFA
14:0	Myristate	16.30
16:0	Palmitate	42.20
16:1	Palmitoleate	1.75
18:0	Stearate	1.32
18:1	Oleate	0.11
20:3w6	Eicosatrienoic (ETA)	0.11
20:5w3	Eicosapentaenoic (EPA)	0.54
22:5w6	Docosapentaenoic (DPA)	10.67
22:6w3	Docosahexaenoic (DHA)	27.00

Fatty Acid Profile

Fatty acid content (%w/w)

Fatty Acid	Name	%TFA
14:0	Myristate	8.85
16:0	Palmitate	26.6
16:1	Palmitoleate	0.42
18:0	Stearate	0.64
18:1	Oleate	0.11
20:3w6	Eicosatrienoic (ETA)	0.22
20:5w3	Eicosapentaenoic (EPA)	2.88
22:5w6	Docosapentaenoic (DPA)	17.04
22:6w3	Docosahexaenoic (DHA)	43.27

Vitamins

Biotin (ug/100g)	131.00
Choline (ug/100g)	83.10
Folic Acid (ug/100g)	350.00
Inositol	83.00
Niacin (mg/100g)	11.80
Pantothenic Acid (mg/100g)	4.95
Pyridoxine (mg/100g)	0.319
Riboflavin (mg/100g)	1.64
Thiamine (mg/100g)	0.38
Vitamin A (IU/100g)	<100
Vitamin B12 (mg/100g)	55.10
Vitamin C (mg/100g)	4.80
Vitamin D (IU/100g)	457.00
Vitamin E (IU/100g)	12.00

Vitamins

Biotin (ug/100g)	237.00
Choline (ug/100g)	188.00
Folic Acid (ug/100g)	357.00
Inositol	180.00
Niacin (mg/100g)	7.16
Pantothenic Acid (mg/100g)	10.10
Pyridoxine (mg/100g)	3.62
Riboflavin (mg/100g)	1.65
Thiamine (mg/100g)	2.40
Vitamin A (IU/100g)	<100
Vitamin B12 (ug/100g)	65.80
Vitamin C (mg/100g)	71.30
Vitamin D (IU/100g)	377.00
Vitamin E (IU/100g)	<0.5

Amino Acid Profile

mg/100g

Alanine	870
Arginine-HCL	1930
Aspartic Acid	1710
Glutamic Acid	3490
Glycine	690
Histidine-HCL	270
Isoleucine	530
Leucine	900
Lysine-HCL	700
Phenylalanine	530
Proline	490
Serine	550
Threonine	540
Tyrosine	350
Valine	720

Amino Acid Profile

mg/100g

Alanine	750
Arginine-HCL	1650
Aspartic Acid	1260
Glutamic Acid	4180
Glycine	640
Histidine-HCL	240
Isoleucine	400
Leucine	700
Lysine-HCL	530
Phenylalanine	420
Proline	400
Serine	460
Threonine	440
Tyrosine	300
Valine	610