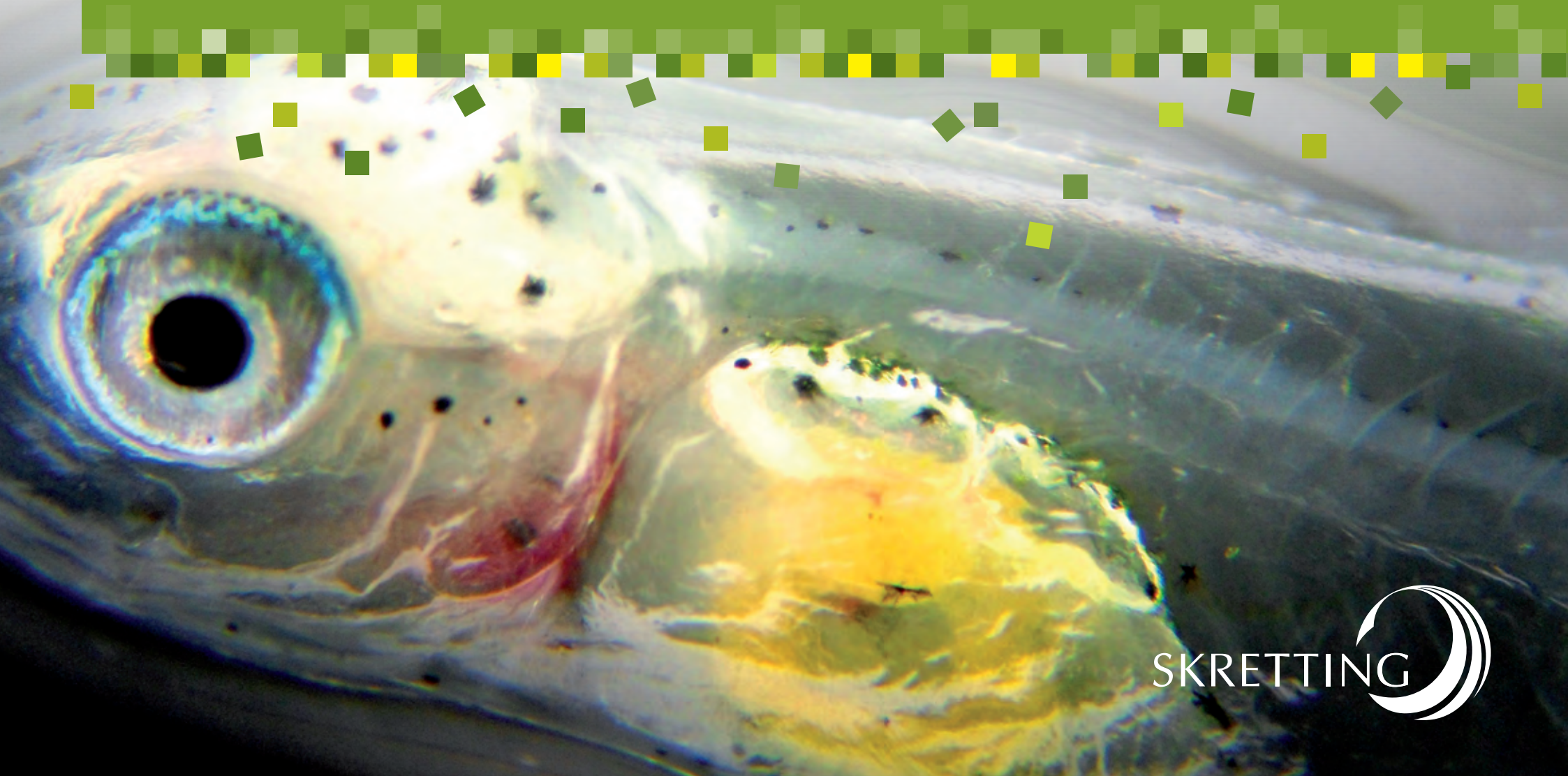
GEMMA

A complete range of micro diet particles for marine fish hatcheries



SKRETTING

Front cover photo: Sea bream larva weaned at 40dph with GEMMA Micro

Sea bass larva weaned on GEMMA Micro

Optimal Development

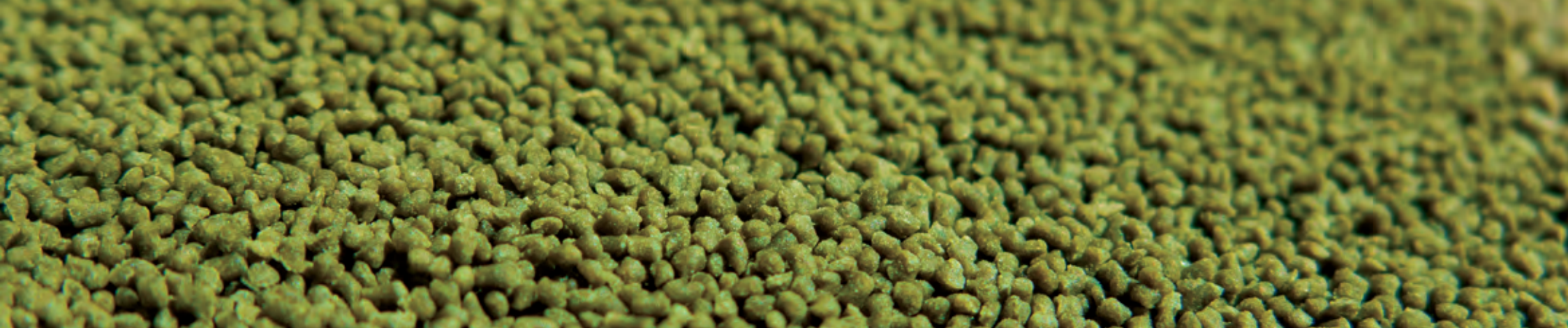
Hatchery production demands perfect harmonisation between the different dietary and biometric requirements of marine fish larvae and juveniles. Thanks to Skretting's Spectrum portfolio, marine hatcheries worldwide have a wide range of possibilities to meet their demanding nutritional needs. In order to answer all these requirements, Skretting has dedicated a complete product range, backed up with a team of specialists for marine fish hatcheries.

Strong R&D efforts from Skretting coupled with customer feedback have led to the creation of our GEMMA range to distinguish more between weaning and pre-growing phases. Weaning represents the switch from larval nutrition with enhanced live feeds e.g. ORI-GO or with pre-starters like GEMMA Micro to juvenile nutrition. Once the weaning phase has been completed, juveniles can be moved onto specialized fish nutrition during the pre-growing phase where the high growth rate potential needs to be realised while ensuring optimal fry quality and vitality. At this stage, no risk should be taken with nutrition and every effort is made to ensure the investment made up to that point is maximized.

GEMMA **Micro** has been developed to replace *Artemia* in the hatchery rearing of marine larvae.

GEMMA **Wean** has been developed to co-feed and wean marine larvae during the larval rearing phases. It is the optimal diet to follow on from rotifers and co-feed with minimal *Artemia*.

GEMMA **Diamond** has been developed for marine fish juveniles for pre-growing and thus is the ideal follow on after GEMMA Wean.



GEMMA Diamond

Unique Technology Process

All GEMMA diets are produced with a sophisticated technological process based on low temperature/micro extrusion. This technology is a gentle process allowing maximal nutrient retention and minimizing protein de-naturation. The high quality raw materials are mixed and pulverised before they undergo a micro-extrusion process at a low temperature and pressure.

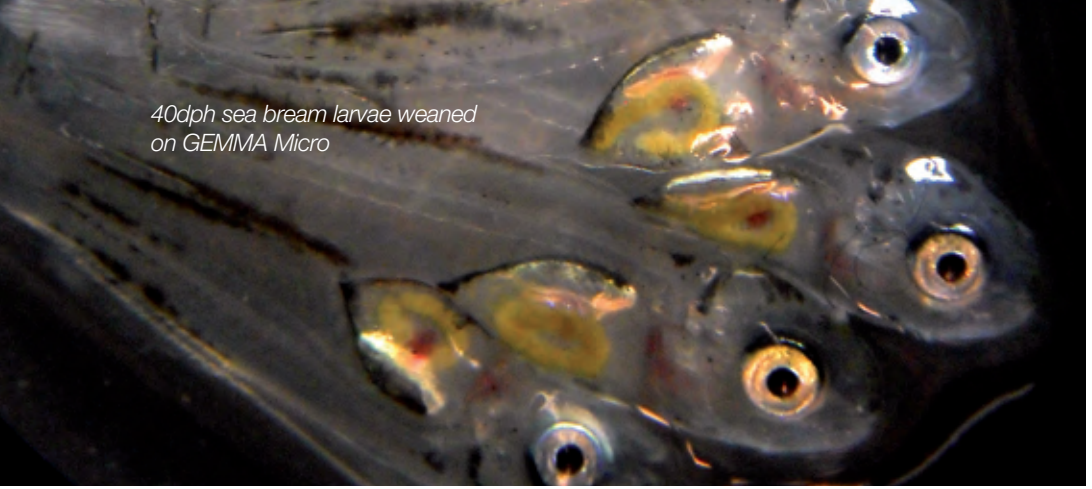
The production process, coupled with the raw material selection results in a more digestible and softer feed compared to a traditional crumble or mini pellet. The optimised digestive and metabolisable properties create better growth and lower FCR. Moreover, thanks to the production technology, the physical properties of the feeds are improved: slow sinking speed is achieved and diet stability is increased without compromising attractability.

Special Feature

A carefully selected blend of marine micro algae gives the GEMMA diets a striking natural green colour. Marine larvae in the wild eat a wide range of organisms including marine algae: each particle of the GEMMA diets thus mimics the nutritional profile of the natural diet. Moreover, the marine algae deliver a positive probiotic effect that is good for larval health and efficient digestion, providing a significant benefit in larval rearing.

The algae also work in matrix with the other ingredients to ensure a highly stable feed exhibiting excellent physical properties in both spreading and sinking speed while maintaining optimal water quality.

All GEMMA diets are based on the principles and formulation of PROTEC.



40dph sea bream larvae weaned on GEMMA Micro

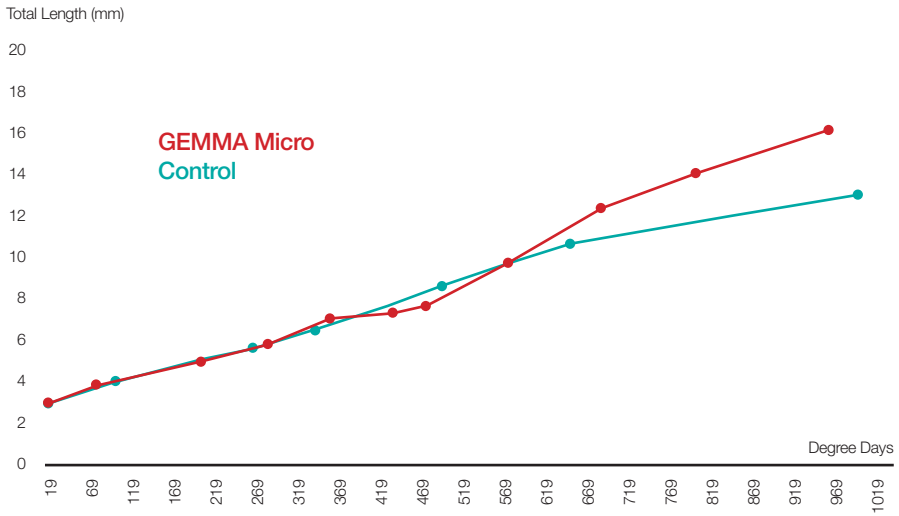
GEMMA Micro

GEMMA Micro is a patented *Artemia* replacement diet which represents a reliable optimised nutrition to follow on from rotifers, improving growth rates and reducing costs. GEMMA Micro is a perfect transition diet between live feeds and dry feeds which ensures maximal digestion, growth and development.

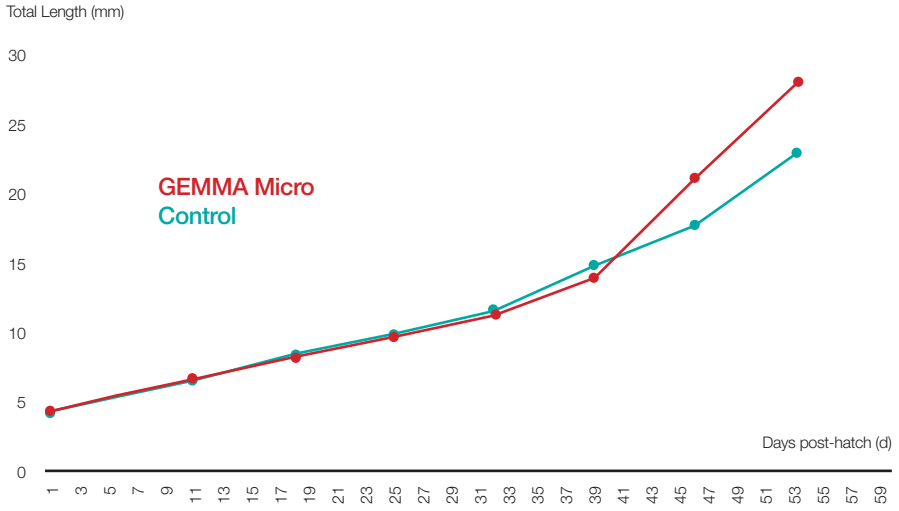
GEMMA Micro is formulated with a high percentage of soluble hydrolysed marine proteins, marine fatty acids and phospholipids as well as with optimum levels of vitamins, minerals and micro ingredients. The multiple marine protein content coupled with the unique production process results in a diet which is extremely attractive to the larvae and easily digested. As a result, enriched *Artemia* nauplii can be economically and successfully replaced.

GEMMA Micro is easy to use whether feeding by hand or by automated micro-feeders as it spreads readily on the water surface and sinks slowly and is available in 4 ranges. With GEMMA Micro, the weaning period is short and fry are extremely vigorous and move readily onto the next feeding phase.

SEA BREAM LARVAL GROWTH



COD LARVAL GROWTH



Improved performance

Reliable quality of the dry feed

Product overview*

	Size (µm)	Proteins (%)	Lipids (%)	Ash (%)	Fibre (%)	Phosphorous (%)
GEMMA Micro 75	50-100	59	14	8	0.2	1.8
GEMMA Micro 150	100-200	59	14	8	0.2	1.8
GEMMA Micro 300	200-500	59	14	8	0.2	1.8
GEMMA Micro 500	500-800	59	14	8	0.2	1.8

*For detailed product information, please refer to product label

GEMMA Micro

Released staff time for fish production compared to live feed

Greater production consistency & growth rates

More vigorous fry

Reduced risk of introducing pathogenic bacteria & viruses to the rearing system

GEMMA Wean

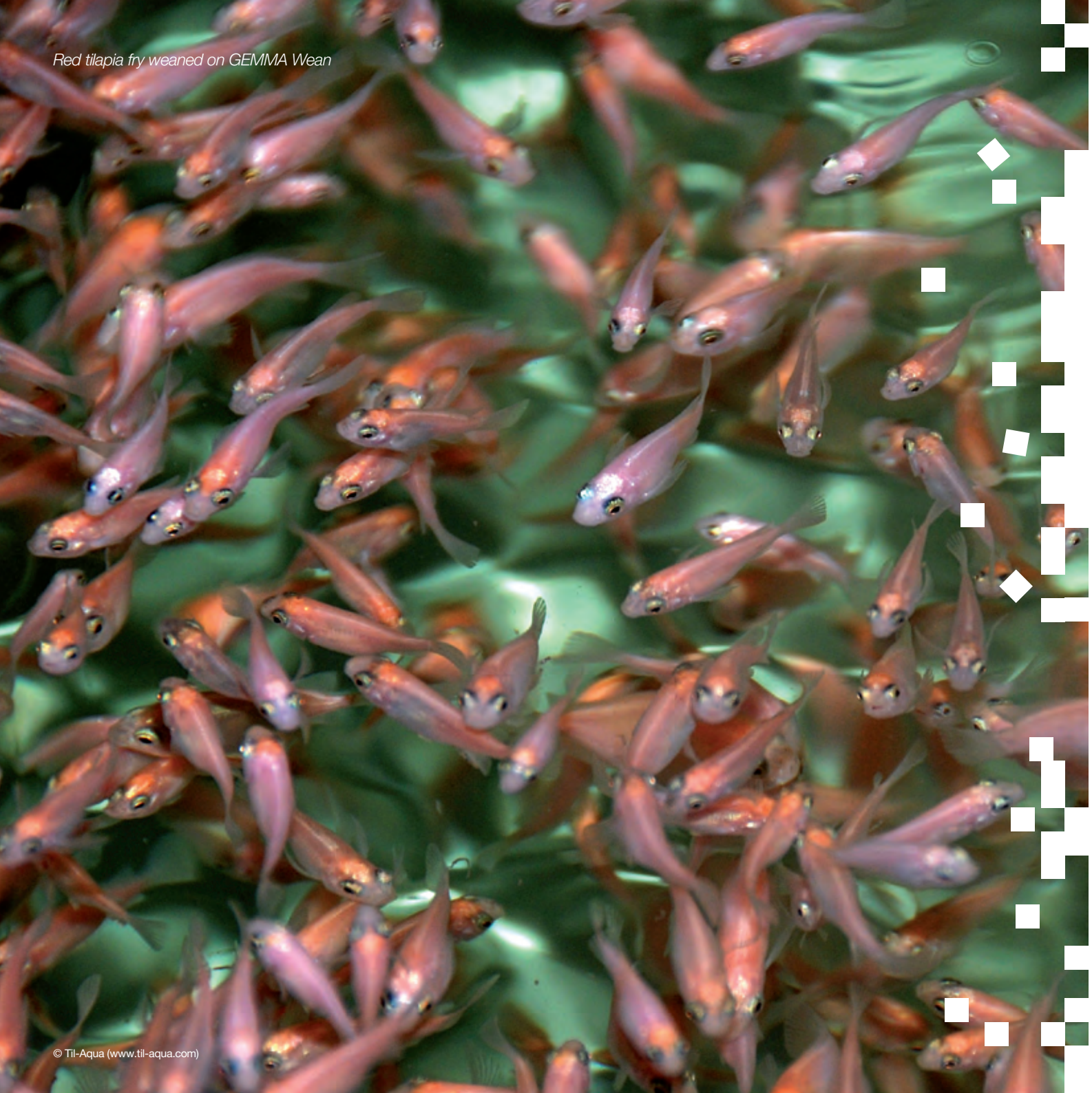
GEMMA Wean is a high end larval co-feeding and weaning diet aimed at *Artemia* optimisation and is fortified with a high level of proteins and phospholipids. GEMMA Wean provides the early weaned juveniles with dedicated fish nutrition and is an ideal follow on from GEMMA Micro or *Artemia*. GEMMA Wean has an optimised nutritional balance and physical quality so that it flows more freely and spreads readily on the water surface. The balance of phospholipid classes together with the production technology based on a low temperature extrusion process improve the physical aspect of the pellets while still retaining the high phospholipid content. GEMMA Wean is available in 0.1mm, 0.2mm and 0.3mm. There is also a 0.5mm micro-pellet, GEMMA Wean Diamond, which covers the early nursery stage from post-weaning to pre-growing.

GEMMA Wean

Product overview*

	Size (µm)	Proteins (%)	Lipids (%)	Ash (%)	Fibre (%)	Phosphorous (%)
GEMMA Wean 0.1	100-250	62	14	9	0.5	1.5
GEMMA Wean 0.2	250-400	62	14	9	0.5	1.5
GEMMA Wean 0.3	350-500	62	14	9	0.5	1.5
GEMMA Wean Diamond 0.5	500-800	62	14	9	0.5	1.5

**For detailed product information, please refer to product label*



Red tilapia fry weaned on GEMMA Wean

Highly attractive to the fry

Excellent floatability

Helps maintain good water quality

Excellent larval growth

High quality of the fry

GEMMA Diamond

GEMMA Diamond has been designed to give juveniles the best start by assuring fast and efficient growth and low feed conversion under pre-growing conditions. GEMMA Diamond contains a high level of multiple marine proteins and has an improved attractability and protein/energy ration for fast-track growth thanks to the low temperature extrusion production process. Pre-growing economics are also improved.

GEMMA Diamond is based on the principles and formulation of PRO-TEC which supports the juveniles in facing stressful events. Consequently, GEMMA Diamond can also be offered prior to stress-induced events.

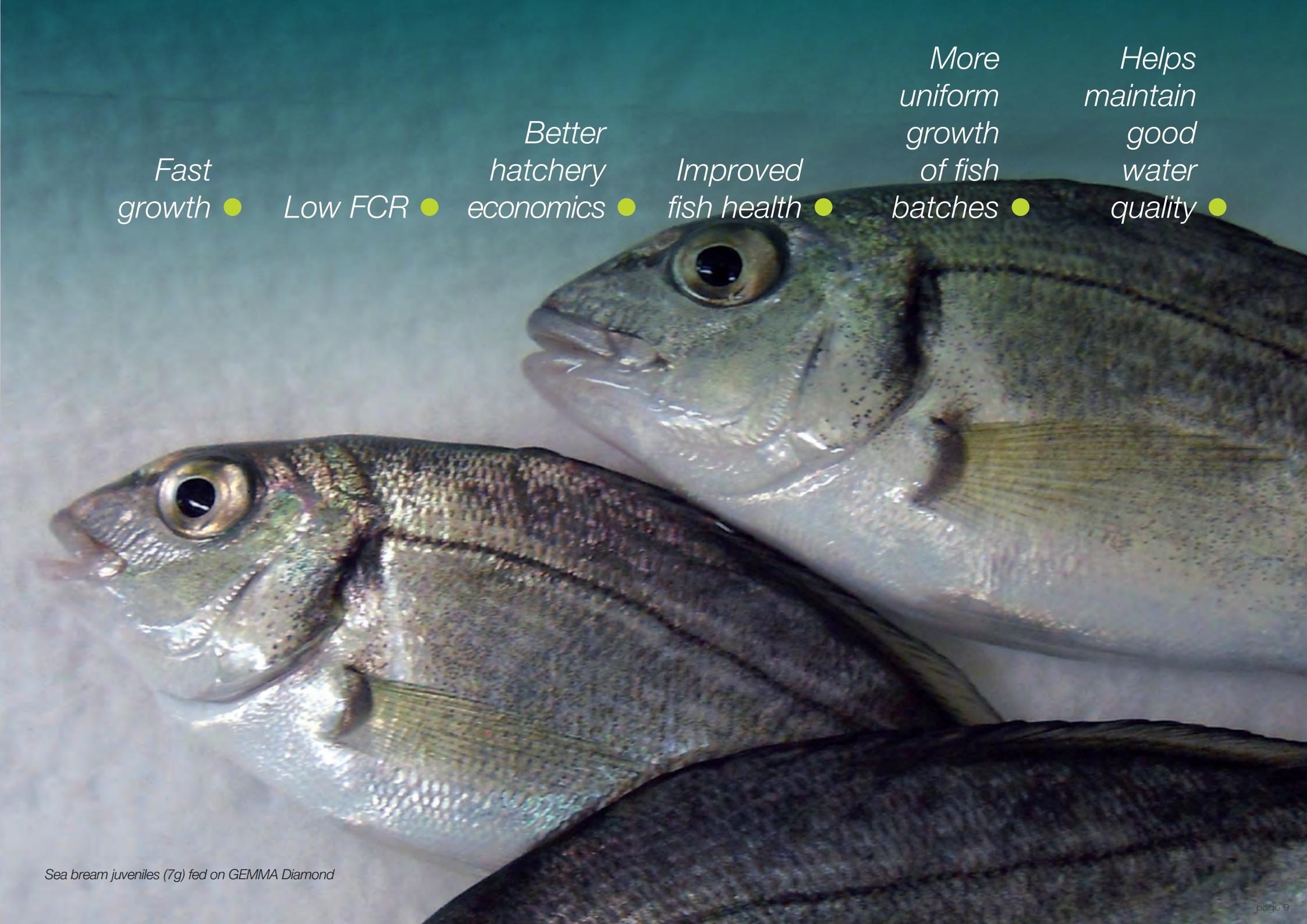
GEMMA Diamond comes in five pellet sizes – 0.8mm, 1.0mm, 1.2mm, 1.5mm and 1.8mm – to follow on from GEMMA Wean.

GEMMA Diamond

Product overview*

	Size (mm)	Proteins (%)	Lipids (%)	Ash (%)	Fibre (%)	Phosphorous (%)
GEMMA Diamond 0.8	0.8	57	15	10	0.2	1.5
GEMMA Diamond 1.0	1.0	57	15	10	0.2	1.5
GEMMA Diamond 1.2	1.2	57	15	10	0.2	1.5
GEMMA Diamond 1.5	1.5	57	15	10	0.2	1.5
GEMMA Diamond 1.8	1.8	57	15	10	0.2	1.5

**For detailed product information, please refer to product label*



Sea bream juveniles (7g) fed on GEMMA Diamond

FEEDING GUIDELINES / RECOMMENDATIONS

Use adequate flow rates to ensure proper water quality. Recommend 8-15 exchanges per day (0.5-7grams). Position feeders close to the water surface to use temporary floatation to improve spread and feed availability. For optimal performance, it is crucial to adjust feeding rate according to water temperature and the fish's appetite.

We strongly recommend using automatic feeders as well as handfeeding. The number of automatic feeders per tank is also critical and we recommend:

- For a 1 cu.m. tank, 1 automatic feeder
- For a 2-3 cu.m. tank, 2 automatic feeders
- For a 3-5 cu.m. tank, 3 automatic feeders
- For a 5-20 cu.m. tank, 4 automatic feeders

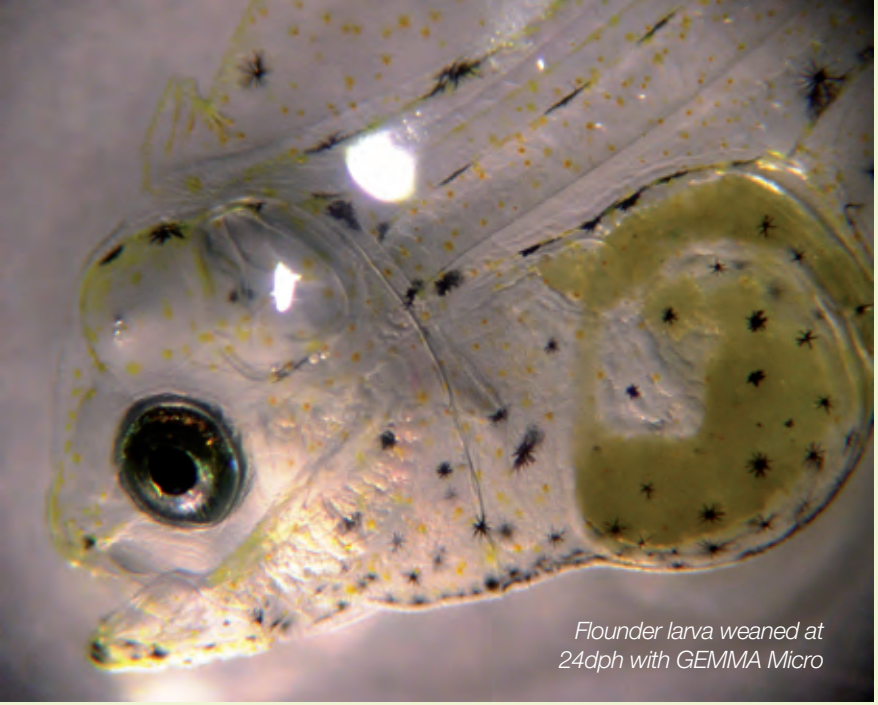
Ensure that the feed is distributed as evenly as possible and that feed is presented almost continuously. We strongly advise feeding 24hrs/day in order to prevent cannibalism until the fry reach 1.5g. Hand-feeding should also be practised 3-4 times per day to satiation in order to gauge feeding activity. Feeding to satiation in this way will reduce size variation. Although fry should be fed to satiation, care should be taken not to excessively overfeed. Water quality should be carefully checked and dissolved oxygen levels maintained at optimal levels at all times.

SEA BREAM

	Feed size (mm)	Fish size (g)	Feed %
GEMMA Wean Diamond 0.5	0.4-0.6	0.3-0.8	6-5%
GEMMA Diamond 0.8	0.7-0.9	0.8-1.1	4.5-5.5%
GEMMA Diamond 1.0	0.9-1.0	1.0-3.0	3.5-4.5%
GEMMA Diamond 1.2	1.1-1.3	2.5-5.0	3-4%
GEMMA Diamond 1.5	1.4-1.6	4.0-12.0	2-4%
GEMMA Diamond 1.8	1.7-1.9	10.0-20.0	2-3%

SEA BASS

GEMMA Wean Diamond 0.5	0.4-0.6	0.3-0.8	6-5%
GEMMA Diamond 0.8	0.7-0.9	0.8-1.1	4.5-5.5%
GEMMA Diamond 1.0	0.9-1.0	1.0-3.0	3.5-4.5%
GEMMA Diamond 1.2	1.1-1.3	2.5-5.0	3-4%
GEMMA Diamond 1.5	1.4-1.6	4.0-12.0	2-4%
GEMMA Diamond 1.8	1.7-1.9	10.0-20.0	2-3%



Flounder larva weaned at 24dph with GEMMA Micro

PACKAGING AND STORAGE

All GEMMA diets are packed in food grade oxygen barrier polyethylene/aluminium bags under controlled atmosphere conditions (nitrogen gas) in order to conserve vitamins and other sensitive nutrients for as long as possible.

Once the bag is opened, we recommend using it within 30 days provided it has been stored in cool, dark and dry conditions.

All GEMMA diets have a 24-month shelf-life.

PRODUCT	SIZE	PACKAGING
GEMMA Micro 75	50-100µ	1kg
GEMMA Micro 150	100-200µ	1kg
GEMMA Micro 300	200-500µ	2.5kg
GEMMA Micro 500	500-800µ	2.5kg
GEMMA Wean 0.1	100-250µ	1kg
GEMMA Wean 0.2	250-400µ	2.5kg
GEMMA Wean 0.3	350-500µ	10kg
GEMMA Wean Diamond 0.5	500-800µ	10kg
GEMMA Diamond 0.8	0.8mm	20kg
GEMMA Diamond 1.0	1.0mm	20kg
GEMMA Diamond 1.2	1.2mm	20kg
GEMMA Diamond 1.5	1.5mm	20kg
GEMMA Diamond 1.8	1.8mm	20kg

www.skretting.com/spectrum