# Skretting Nexus

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## Keeping it green

OceaNZ Blue Limited winner of Skretting GREEN award

Stocking densities: how much is too much?

Environmental Management Systems in Aquaculture

SKRETTING

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Cover photograph:
Barramundi, Atlantic salmon
and Skretting feeds

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# Nexus

## About this issue

**Stephen Scott** Sales & Marketing Manager - Skretting Australia

Although everyone is talking about going green and reducing their carbon footprints by living, shopping, commuting and working better, the reality may be that most people don't know much about what being green really means.

A strong environmental awareness is particularly pertinent to the aquaculture industry, where sustainability is so important, not only for the obvious environmental advantages but also for the brand image of the finished product. Increasingly, little by little, we are all, as consumers and manufacturers, becoming a little greener. Whilst some of this change has come by way of legislation, I think the vast majority of change has come about by an increasing knowledge and understanding that we all have to change our way of thinking for the greater good.

At Skretting Australia, we are increasingly implementing positive environmental improvements. Care for the environment has always formed part of the Skretting psyche, and recently our new administration office was built with energy efficiency in mind - with plenty of glass and oversized eaves in order to naturally regulate internal temperature throughout the seasons. We also have waste and energy reduction programs in place, and have landscaped our surrounds with some 600 native trees. We continue to work as much as possible towards a paperless work environment. Of course, we work closely with other Skretting companies around the globe and the ARC in Norway to investigate and solve the larger industry issues of sustainability, alternative raw materials usage and waste.

In future editions you will see more on Skretting's initiatives on environmental issues, please feel free to share your achievements with us in the interests of a greener, environmentally responsible industry.

## Gemma - the next generation

Following extensive field testing, Skretting has released a newly updated range of Gemma hatchery diets. The new range now includes Gemma Wean and Gemma Diamond. These diets are ideal for the larval rearing of species such as yellowtail kingfish, barramundi, mulloway, cobia and Murray cod.

GEMMA WEAN is designed as a high end co-feed and weaning diet aimed at optimizing the Artemia feeding phase. It is available in 0.1, 0.2 and 0.3mm sizes and is the ideal diet to follow on from rotifers and co-feed with minimal Artemia. With good weaning practices the number of Artemia used can be optimized.

GEMMA DIAMOND replaces the old Gemma PG and is a post-weaning diet available in 0.5, 0.8, 1.0, 1.2 and 1.5 mm sizes. It is designed to be fed following Gemma Wean and contains a proprietary blend of essential oils, vitamins and immune enhancing agents all of which improve larval health and performance.

Both Gemma Wean and Gemma Diamond are produced on a highly specialised line that produces micro extruded pellets at low temperatures and pressures. The new diets utilse new ingredients, have a tighter distribution of pellet sizes within each size class, have increased water stability and slower sink speeds, all of which combine to improve the health, growth, FCR and survival of larvae during and after weaning.

For more information on the Skretting Hatchery range of diets please contact Skretting on +61 3 6216 1212 or visit the Skretting Australia website. ■

www.skretting.com.au

# Environmental Management Systems in Aquaculture- security for the future

**Utilising the natural resources used by fisheries and aquaculture in a sustainable, responsible way is fundamental to the future of the aquaculture industry.**

More and more companies are implementing Environmental Management Systems (EMS) to reduce environmental impacts, improve efficiency, comply with legislation, and demonstrate to clients their commitment to environmental protection.

## WHAT IS AN EMS?

An EMS establishes a continual business cycle of planning, implementing, reviewing and improving the actions that an organisation undertakes to manage its risks and opportunities relating to not only the environment, but food safety and quality, occupational health and safety, profitability, public relations and other aspects of the organisation.

The ability to demonstrate environmentally responsible actions is the key to future access to vital natural resources and the livelihoods of current and future generations of aquaculture industry operators.

More and more seafood industry businesses and organisations (fishing, aquaculture and post-harvest) are setting up EMS to improve — and demonstrate — good environmental performance.

Developing an EMS often results in increasing profits, improving relations with the community, and can act to strengthen aquaculture's credentials within governments and the general community.

## WHY HAVE AN EMS?

More reasons that you may wish to think about implementing an EMS include:

- Save time and money
- Secure access to fisheries and aquaculture sites
- Demonstrate that you use natural resources in a responsible, sustainable way
- Gain community support — good environmental performance is the key
- Gain a competitive advantage through best environmental practice — and help to secure market access
- Gain a reputation as a responsible operator — have more influence in debates about your industry
- Demonstrate compliance with relevant laws
- Increase safety and morale — fewer accidents are their own reward and can reduce insurance rates

An EMS can be designed to suit your own circumstances and priorities, and there is no stock standard EMS. An EMS can be designed to manage a particular environmental risk — for example, the environmental impacts of a certain fishing method or aquaculture activity, focus on more efficient use of your resources (less waste = more profits), integrate environmental management into an existing management system — for example, a system for managing food safety or other aspects of a business.

## WHO CAN HELP?

Help is available for implementing an EMS in your business. Seafood Services Australia have a number of very good resources available for purchase on their website, including EMS kits and manuals.

Find them at www.seafood.net.au

Skretting Australia is currently working towards external certification of our Environmental Management System to integrate into our certified Quality Management System. ■

### Benefits of an EMS

- Demonstrate environmental performance
- Gain knowledge
- Better corporate reputation
- Manage risks
- Maximise opportunities
- Be innovative
- Adopt best practice
- Maximise profit
- Minimise waste
- Gain community support
- Competitive advantage

# Stocking density: how much is too much?

**Stocking density is an important consideration for every fish farmer. Stocking density is typically expressed as kilogram of biomass per cubic metre (kg/m³). This measurement assumes fish are evenly distributed throughout the water column, which is rarely the case. So how and why does stocking density vary amongst species, and what is right for your situation?**

## LARVAE LIMITS

Stocking densities of marine larval fish have been examined in a number of different species. Larval density is commonly expressed as the number of larvae per litre.

In a study by Battaglene and Brown, striped trumpeter larvae were reared at densities from 1 to 40 larvae/litre and whilst there was no difference in survival, growth was impaired at the higher densities and an upper limit of 5 larvae/litre recommended (Battaglene and Brown, 2006). In another study, barramundi larvae were shown to have reduced survival and growth in higher densities (172 larvae/litre) compared to lower densities (43 larvae/litre) and generally densities <50 larvae/litre were considered optimal (Palmer et al., 2007).

Comparing these studies displays obvious species-specific differences, even in larval fish. Unlike larger fish (>100g), the significance of stocking density is more a function of larvae to live prey interactions. A greater density requires a greater abundance and/or regularity of enriched, live feeds, and leads to more larvae-larvae interactions.

## FINGERLINGS

For freshwater hatcheries, differences between species are also evident (summarised by Willoughby, 1999). Assuming water quality is high, species such as Arctic charr tend to thrive as fingerlings in densities greater than 40kg/m³ and even as high as 100kg/m³. Conversely Atlantic salmon and rainbow trout do not tolerate such high densities. The theory remains that species such as Arctic charr tend to change their shoaling behaviour, but this does not occur in other members of the salmonids. This change in behaviour results in greater feed intake, whilst the additional social interaction and competition for feed in species such as Atlantic salmon and rainbow trout actually has a negative effect. For Atlantic salmon parr, a recent study by Diesen Hosfeld et al (In press) demonstrated densities between 21-86kg/m³ could be achieved without any apparent effect on growth or smoltification, so long as basic water flow, water quality and feeding rations were maintained above minimum standards. A failure to provide these minimum standards for water quality and problems arise, regardless of the density.

## LIMITS CAN BE DEPENDENT ON FARMING METHOD

In grow-out operations for species such as barramundi, the farming method used is one of the major influences on stocking density. Sea-based operations can have stocking densities ranging anywhere from 10-30kg/m³, ponds can hold between 20-40kg/m³, while tank-based operations with environmental control (particularly of oxygen) can be 50kg/m³ or higher. These values are, however, very general. It is not uncommon to find, for example, pond-based systems where farmers are pushing the boundaries and rearing barramundi at densities greater than 50kg/m³. Often, this is not at the expense of fish welfare, but rather is possible due to some ingenious on-farm strategies and technologies to allow these densities to be achieved.

Whilst barramundi are capable of these stocking densities, they would strike fear into a typical salmon farmer where densities at grow-out are typically 15kg/m³ or less. Barramundi tolerate these conditions not because they are an outwardly social animal but because their evolutionary path has seen them develop the ability to grow in warm, variable salinity environments with less than ideal water conditions (e.g. oxygen, pH, high turbidity). Conversely, salmonids natural history involves oceanic environments and clean, cold freshwater flowing through rivers. Yellowtail kingfish, a species also naturally used to relatively 'clean', well oxygenated oceanic waters, are commonly reared at Australian aquaculture farms at

densities approaching 15kg/m$^3$.

Densities are also important for behavioural and seasonal implications. Densities too low mean schooling behaviour can be affected, too high and competition for feed and reduced water quality impacts growth and fish health. Seasonal variations in stocking density are also important. In Tasmanian Atlantic salmon during summer, targets for stocking density are reduced compared with winter - this is because water temperatures rise, metabolism and biological demand for oxygen increase. During these times farms typically allow stocking densities to peak around 8-10kg/m$^3$, compared to 10-15kg/m$^3$ during winter. Even at the lower densities used during summer problems can arise, particularly if nets become overly fouled thus reducing water flows and limiting oxygen availablility.

Australian researchers at the Grafton Aquaculture Centre, NSW DPI, demonstrated that silver perch fingerlings (~110g) reared at between 5 to 90kg/m$^3$ typically had the highest mortality and FCR at the lowest densities (<10kg/m$^3$) compared to those reared at the higher densities (Rowland et al, 2006). The coefficient of variation (CV) was also highest in the low density groups. The reason for these differences was due to a proportion of fish growing well while others did not, thus leading to hierarchies through aggression in the larger animals and sub ordinance in the smaller. Higher stocking densities can mitigate this as it is more difficult for a few fish to dominate in a larger population.

## THE ANSWER?

So to address our initial question about what density is the correct one. Well unfortunately there is no simple answer. Tolerable densities are very dependent on fish size and species. The most obvious and important finding in all species is that stocking density and water quality are inherently linked. Economics of course is also a factor in aquaculture, in regards to both what you want to earn, and what you are prepared to pay to achieve this. ■

## UK TROUT PRODUCTION

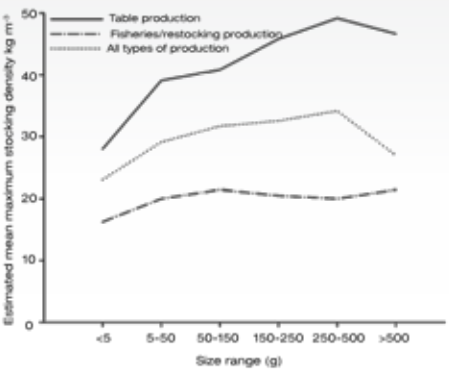
An excellent survey of United Kingdom trout farms undertaken by the University of Stirling highlighted the diversity of stocking densities used, and, more importantly, why they are used.

The survey by North et al (2006) which captured almost half of the total UK rainbow trout production at the time identified two key observations; firstly that density is heavily size dependent, with smaller fish (fry/fingerlings) cultured at lower densities than their larger, heavier counterparts; secondly, the type of production had a significant influence on the densities used (see RIGHT).

Not surprisingly more intensive aquaculture operations specific for the food (table fish) market grew trout at almost twice the densities of fish reared for restocking projects. To allow this increase in densities farms growing table fish also typically using injection of pure oxygen into the water, whilst the preferred method at the restocking farms was for the cheaper, simpler aeration option.

This again raises the point about water quality, and the underlying influence on maximum stocking densities. Additionally, economics plays a major role - stocking densities can be raised in most cases if you are prepared to pay to improve water quality, through increased water flows, increased oxygenation, and/or stripping recirculated water of metabolites.

**Rainbow trout stocking densities with different production methods in the UK (from North et al., 2006)**




References for this article are available upon request.

# Skretting GREEN award

**Skretting Australia recently launched the Skretting GREEN award, asking our customers to come up with ideas for recycling their product bags. Thank you to those who submitted entries - we received many interesting replies!**

Firstly, congratulations to the winner - OceaNZ Blue Limited. Rod Roberts, Research and Development Manager, gave us an update on the current situation on the eastern side of the Tasman.

Rod says, "Few of the NZ recyclers handle low density polyethylene (LDPE), but some do. I've had interest from Waste Management (jpike@wastemanagement.co.nz) based in Auckland. There is a cost in transport to the recycler, but they don't charge (or pay) for the raw material."

OceaNZ Blue also have programs in place to reuse plastic packaging in local schools and responsible retailers, such as garden centres. This is a great effort by one company to minimise the environmental impact of feed packaging.

Another entry, from Glenys Moore at Mt Cook Salmon Farm, located in the Mackenzie Basin in the middle of the South Island of New Zealand, let us know that all their bags are recycled/reused. There, empty bulk feed bags are rolled up, put into one bag and freighted to Timaru which is a port about 160kms from Twizel. The bags are then filled with gravel or aggregate and shipped to the Chatham Islands where the gravel is used for roading and for making concrete.

Here in Tasmania, the majority of bags are transported to China for recycling. In China, bags are melted down and converted to thread, which is then woven to make clothing.

Skretting are committed to improving all production processes into the future to maintain a minimum environmental impact. In 2009, we have been looking towards reducing our impact even further by looking at minimising waste and maximising recycling. We can't be responsible for what happens to our product bags after they have left our site - that is where our customers come in.

Thank you to everyone for their continued efforts in reducing the impact of our product bags.

Please see our website for more information on who to contact about recycling in your area. ■

Skretting Australia have teamed up with Veolia to recycle our product bags. For more details on recycling in your state, visit our website and click on the Environment tab

www.skretting.com.au

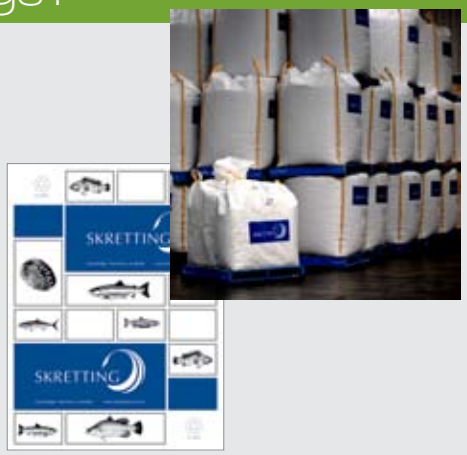
## What can you do with your Skretting bags?

Our bulk bags (800-1000kg) are made from polypropylene (PP), our small bags (20-25kg) are made from low density polyethylene (LDPE).

Both products are 100% recyclable!!

These bags can all be recycled. To make this easy for recyclers, keep bulk and small bags separate, and remove as much residue as possible. The cleaner the bags, the better they are for recycling.

There are a number of companies interested in recycling these bags in Australia - please see our website for more details.



# OceaNZ Blue Limited

**OceaNZ Blue is New Zealand's largest abalone farm, located at Bream Bay, 1.5 hours north of Auckland. The company was formed in 2002 and started to market commercial quantities of paua (NZ's name for abalone) in 2008. The Bream Bay site provides access to oceanic-quality seawater and a good temperature profile for the local NZ species, Haliotis iris.**

## FACILITIES

The farm is about 300 metres inland from the ocean and draws its intake water through two very large pipes that were originally installed for the inoperative Marsden oil-fired power station. The station was built just prior to the oil shocks of the 1970's and was mothballed before commissioning, but the unused water intakes now serve both OceaNZ Blue and the adjacent NIWA Aquaculture Park.

Around 100 litres per second of seawater is drawn from 600 metres offshore in Bream Bay and is filtered to 10 microns. Once on farm, water is partially recirculated and water management includes biofiltration and UV treatment. The quality of the water used helps OceaNZ Blue maintain paua health and a disease-free status.

OceaNZ Blue operates its own hatchery and nursery, capable of producing 3 million 10mm juveniles each year. The quality of spat is being improved each year by the operation of a broodstock selection programme. Production facilities are a combination of slab trays and 'tipper tubs', and are to a significant degree self-cleaning. Growout facilities are indoors and in low light conditions, as dim lighting is preferred by paua.

## PROCESSING and MARKETS

OceaNZ Blue has a sophisticated cryogenic harvesting and processing facility on site, maximising the quality and freshness of delivered product. About 10-15% of sales are domestic with the balance sold throughout South East Asia and other Northern Hemisphere destinations. Product is sold fresh, frozen or canned.

While much product is sold by weight, the paua market has the unique characteristic of some product being effectively sold by length; it is difficult to imagine purchasing salmon by the metre, but this approach is not uncommon in the paua market.

## THE FUTURE

OceaNZ Blue currently stocks around 1.5m juveniles per annum and harvests 90t of paua. Within 2 years production is expected to reach 140t per annum and around 3m juveniles stocked. ■

*Above right: Jennifer Theodore (Grow-out Technician) and Lynette Suvalko (Team Leader). Below right: Owen Bunter (Operations Manager) and Josh Birss (Nursery Technician). Photographs courtesy of OceaNZ Blue.*

OCEANZ BLUE LIMITED

## Farm Facts

| | |
|---|---|
| Abalone produced per year | 1 500 000 |
| Number of employees | 25 |
| First year of operation | 2002 |

# Wheat & Wheat Gluten

**Wheat is an important addition to most Skretting feeds - it is included as a source of starch, which is the primary functional binding ingredient.**

## SOURCES

Wheat for use in Skretting feeds is sourced from South Eastern Australia (Riverina and Malley - see image to the right), and is harvested using combine harvesters on broad acre farms.

## HARVEST

At harvest the wheat is tested and segregated into appropriate grades based on protein levels, falling number, test weight and screenings.

To extract wheat gluten, wheat is milled to form a flour, before water and salt are added and mixed to form a slurry. The protein fraction - being wheat gluten - forms as clumps and is physically separated off. Starch is washed out and stored, and the wheat gluten is dried, hammer milled and packaged. Skretting Australia's wheat gluten is produced in Nowra, NSW.

## STORAGE

Wheat is stored in bulk silos and delivered to Skretting Australia via containers. Wheat gluten is also stored in containers, and is received in bulk bags and tipped when required.

## SUSTAINABILITY & QUALITY

Wheat is the major crop of Australia, but the last few years have delivered lower tonnage on previous years because of the effects of the drought. Wheat is a renewable crop however yields are subject to climatic conditions.

In many of the wheat growing regions, lupin is grown in rotation, returning nitrogen back into the soil. The dehulled lupin kernels are ground to a meal, which is also used as a protein source in Skretting feeds.

Samples are tested by the supplier for pesticide and herbicides residues for each contract supplied to Skretting.

Growers supply vendor declarations to the wheat traders disclosing which pesticides and chemicals have been used in growing the wheat.

## FORMULATION

Wheat addition is formulated with reference to crude composition and starch quality. Wheat gluten is a highly concentrated and accessible protein source for fish.

Near infrared reflectance (NIR) is used to monitor wheat and wheat gluten composition to maintain consistent product quality.

Snippets

## Coming soon . . .

We are currently setting up a customer login section on our website. This section will contain useful calculators, reports, food safety documents and detailed product information.

Stay tuned!

## Reminder - Nexus via email

Please let us know if you would prefer to receive Nexus via email.

Email: sophie.noonan@skretting.com with "email Nexus" in the subject line

## Australasian Aquaculture Conference 2010

The next Australasian Aquaculture conference will be held in Hobart in May 2010.

The theme of next year's conference will be "Keeping pace with change".

To keep up to date with the latest information, visit the Australian Aquaculture Portal at:

www.australian-aquacultureportal.com

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