Feed Care principles are central to profitable farming

DR MATTHEW BRANSDEN TECHNICAL ACCOUNT MANAGER

For most aquaculture operations, feed costs represent about half of the total cost of fish production. With this in mind, it is essential that every means is taken to ensure the feed arrives to the fish as it was intended; nutrition specific to its developmental needs, in perfect condition and without waste.

These basic principles underpin Skretting’s ‘Feed Care’ program conducted by the Technical Account Managers. Feed Care can consist of on-farm assessments such as feed audits, which in turn lead to ‘pond side’ conversations about observations, or more targeted farm-staff education and training sessions. While Skretting’s Technical Account Managers are always happy to discuss the principles, the fundamental practices of ‘Feed Care’ should be at the core of any fish farming operation.

APPROPRIATE STORAGE IS ESSENTIAL

Significant care is taken during and following the manufacture of Skretting’s feeds. Rigorous sampling and quality assurance procedures are undertaken to ensure the diet meets all of Skretting’s stringent nutritional parameters. In order to maintain ideal nutritional characteristics it is essential that proper storage occurs from the moment feed arrives at your farm.

Skretting Australia’s locally produced products have shelf lives of 6 months for hatchery and pigmented feeds (e.g. those used for salmon), and 12 months in non-pigmented feeds (e.g. those used for trout/land). Skretting’s recommended shelf lives, however, assume appropriate storage conditions are in place, and farmers must take this into account.

“We are often asked how to store feed” explains Matthew Bransden, one of Skretting Australia’s three Technical Account Managers. “The simple answer is that stable environmental conditions are best. Feed should be stored in cool and dry facilities and away from direct sunlight. Refrigeration is perfect, but it is not commonly used. Farmers in the northern parts of Australia should be particularly mindful of adequate storage to prevent feed becoming damp in humid conditions, which can be particularly detrimental to feed quality. First in, first out (FIFO) principles should be used to turn over stock, and appropriate measures should be in place to control rodents or other wildlife to prevent them infesting bags.”

FEED SYSTEM MAINTENANCE IS KEY

Finfish farms use a variety of feeding methods, from simple hand-feeding, to semi-automated belt feeders and blower systems, to more advanced centralised feeding systems capable of feeding multiple pens of fish simultaneously. “Typically as the scale of the farming operation increases, so too does the level of automation” indicates Patrick Miller, Technical Account Manager. “While automatic feeders have their advantages, they are not always faultless and farmers need to be aware they can impact on feed quality, for example by causing breakage.”

Some examples of problems that commonly occur in feeding systems. Top to bottom: a poorly operating doser crushing feed; feed is spread too close to a pen edge – the activity of the fish and water movement will push pellets outside of the pen, pipe curvature is too abrupt.
Skretting's Technical Account Managers conduct routine audits on large centralised feeding systems, but the principles are also applicable to smaller semi- or fully-automated systems and should form part of a regular feed maintenance checklist on farms. These audits are extensive and include aspects such as monitoring blower systems and speeds, checking running temperatures and identifying breakage points through visual inspections or by collection of feed samples. “We use a range of equipment as part of the Feed Care program, including cameras, infrared temperature probes and airspeed monitors. New to our Feed Care toolkit is a pipe camera that allows us to explore deeper into parts of feeding systems to identify faults,” explains Patrick.

“Feed Care programs are not unique to Skretting Australia. Our sister companies also offer similar services to some customers, and we hold regular internal global training programs as new feeding technology develops.” Patrick continues “One of the most common issues we see in automated systems are breakage points, be it a crush point in an auger, a distributor that is not aligned correctly, poor welds in plastic or stainless pipes, or pipes with abrupt angles.

Purpose built aquaculture feed systems are specifically developed to be gentle on pellets, however, faults can still be found from time to time. The smallest obtrusion or misalignment particularly in the early stages of the system can cause disastrous damage to the feed; by the time it completes its journey. “Through audits we have identified systems causing breakage as high as 10%. Basically a tenth of the feed is largely or completely destroyed before it reaches the fish and cannot be eaten.

In centralised feeding systems, which might be feeding 50 tonnes per day, the financial implications can be enormous. “While issues in advanced centralised feeding systems can become expensive quickly, more basic systems are not immune to problems and they should not be overlooked as they too can lead to unnecessary expense. “I recently inspected a relatively basic hopper and blower system mounted on the rear of a utility truck on a small-scale farm” says Matthew. “There was feed dust on the roof and tray of the site. The customer and I investigated this further and discovered it has been occurring for several months. After we took a sample we found more than 1% dust was being generated; the feed pipe had significant internal wear not obvious on the outside, and it was effectively working like a cheese grater on the feed. While this percentage might appear small, the cost of damaged feed wasn’t. We calculated it had produced dust equivalent to $8000 since the issue was first noticed but left unresolved. The cost to replace the pipe was less than $200.”

Skretting’s recommendations are that the total breakage, which includes both dust and chip fragments, should be less than 1%. Dust caused in systems is the greatest issue as it is completely lost, while some chip fragments may be eaten by the fish. Feed system breakage is also recognised by some certification bodies. For example, the Aquaculture Stewardship Council (ASC) set their own criteria in the Salmon Standard on dust production that farms need to adhere to if they seek ASC compliance.

WASTE COSTS

“Feeding on a fish farm is critically important. While all other activities support fish growth, feeding the fish actually grows them. Keeping fish alive and growing them – are fundamental to a farms success” explains Ben Wybourne, Skretting's Technical Account Manager in New Zealand. “Appropriate feed management, in particular reducing waste, has immense influence on farm profitability.”

A study undertaken by Mertoni (1994) quantified the difference between a theoretical feed conversion ratio (FCR) compared to an actual FCR in salmon. The author found that the actual FCR was 0.3 points higher than the theoretical FCR, or what should be possible. Critically, almost half of the difference was attributable to poor feed management techniques.

Extrapolating from this research, for a farmer producing 100 tonnes of fish annually, it suggests as much as 15 tonnes of feed could simply be wasted by poor feed management. “Routinely on farms we see feed waste” continues Ben, “Unfortunately this has several costly consequences. Firstly, it is simply the value of the feed; secondly, it is lost feeding opportunity – that feed should have gone to somatic growth; thirdly, it can also have impacts on eutrophication of the water as the unused feed decomposes, or it can attract other unwanted animals if it is left on a pond bank, for example.”

Skretting’s Technical Account Managers undertake a number of assessments during their Feed Care audits on farms that specifically address waste, both on-farm and beyond the surface. “Above the surface waste is easily identified; a spilled bag here or pellets found floating out of an outlet pipe” explains Ben. “Below the surface, identifying waste becomes a little more complicated to assess. In order to do this we use a range of equipment such as underwater cameras. It is also essential to have a good understanding of fish feeding behaviour. We consider how quickly fish are being fed and if they have the opportunity to consume it; are feeds being distributed too close to the edge of the pen, or is wind or tidal action carrying the feed outside of the pen? Is the distribution of the pellets not sufficient to give all fish in the school a chance to feed, and are false, early stop signals leaving some fish unfed?”

The observations are discussed with staff alongside a pond or pen, stressing the importance of feeding and associated costs, or examples are photographed and then presented to farm staff later during training sessions to show where improvements could be made. “What we intend to provide to farmers are our recommendations, not rules. Typically it is very well received and there is considerable engagement and discussion. We explain that the basics of Feed Care should always be front of mind and that feeders in particular are fundamental to the profitability of the operation” concludes Matthew.

DO(S) AND DON’TS OF FEED SYSTEMS

DO...

- Use specifically engineered fish feeding equipment and inlet system specifications
- Develop a regular maintenance protocol
- Inspect systems for unplanned dust and build up – are there issues of misalignment and wear and test leading to breakage points
- Routinely clean systems to prevent build up that will lead to further breakage (e.g. ‘pig’ pipes
- Collect feed samples by holding a骷髅 over the end of pipes running under normal conditions and visually inspect for breakage
- Frequently calibrate equipment to ensure you are feeding the quantity it suggests you are feeding – this can be particularly essential with pellet size changes
- Ensure you have adequate backup equipment and spares so equipment failure does not result in lost feeding opportunity
- Ensure operators have adequate training and stress the importance and cost of feeding!

DO NOT...

- Let it go unchecked or accept “It’s always done that” – breakage quickly adds up and becomes expensive
- Attempt to make an ‘on farm’ version of commercial feeding equipment – purchasing specifically designed feeding equipment that improves breakage by as little as 1% improvement quickly pays for itself
- Let non-professionals work on sophisticated feeding systems
- Try and fix a blockage by ‘shaking’ it with more feed
- Clean feed systems with chemicals

Above: a welding join will chip away at pellets. Below: a ribbed pipe is beginning to show internal wear with pellet residue and will act like a cheese grater on the feed.
Skretting delivers a complete range of system-specific recirculation feeds

Through the incorporation of functional ingredients into very precise formulations, Skretting’s upgraded RecircReady portfolio is helping freshwater salmon hatcheries achieve optimal fish performance, water quality and efficiency.

DR NICOLE RUFF  PRODUCT MANAGER

Salmon smolt production has profited greatly from the escalation of recirculation aquaculture system (RAS) technology, not least because it enables strict control of environmental conditions that result in improved smolt quality and supply. As such, the number of these systems coming online globally continues to grow at an increasing rate.

UNIQUE CHALLENGES

While small smolt production will continue to be significantly scaled up through RAS, these production systems also bring their own unique challenges, in particular dealing with organic matter in the water column and the need for efficient removal of faecal matter. To meet these and other issues head on, Skretting has developed its RecircReady concept.

Developed by Skretting Aquaculture Research Centre (ARC) through extensive trials at research facilities in Norway and Italy, RecircReady feeds incorporate very specific patented functional ingredients that bind faecal matter. In recirculation systems, this means it is easier to filter and remove solid waste particles, thus reducing the amount of suspended solids in the system.

As the faeces have a higher structural stability, soluble teaching of nutrients is substantially reduced. For example, soluble nitrogenous waste is reduced; thus the demand on the recirculation biotiller is less. Crucially, it was also established that there were no negative impacts on digestibility or fish performance. Commercially, the RecircReady feeds are subsequently identified by the use of the name ‘RC’.

Roei Sandvik, Global Product Manager for Skretting’s Salmonid Hatchery feeds, explains: “The ‘RC’ in the product names literally stands for ‘recirculation’ and indicates to producers that these diets were designed for this type of system. Skretting was the first feed company in the world to develop and launch this type of product and we are very pleased with the results. Skretting Australia, for example, introduced RC diets in our freshwater feed range for RAS systems. The net result is that we have found a solution that can ultimately help farmers improve their profitability.”

THE RecircReady RANGE FOR SALMON

Globally, RC diets were launched in 2010 and complemented Skretting’s already existing hatchery feed portfolio. The feed range starts with Nutra RC formulations for fish from around 0.2 g.

Nutra RC is designed to be a slow sinking feed that enables the maximum amount of time for fish to consume it, thereby reducing pellet waste and improving water quality. Following on from the Nutra RC is the Nutra Supreme RC, specifically designed to prepare fish for transfer to sea while maintaining the ‘RC’ benefits. Skretting Australia was one of the first of Skretting’s operations to launch the RecircReady range.

“Literally overnight our customers were providing us with very positive feedback,” says Nicole. “This was exactly the case for Tasmania’s largest salmon farming company, Tassal. Doug Pavley, Tassal’s Hatchery Manager, explains: “When we introduced the RC diet range to our four million smolt production RAS facility, not only did we see benefits of reduced water turbidity of Nutra RC, but noticeably the demand on the filtration system lessened.”

Since using Nutra RC less ozone is needed to maintain water quality and there is less organic matter finding its way into the biotifiers. “While the RecircReady concept has many benefits for recirculation systems it also improves water quality in conventional flow-through hatcheries,” continues Nicole. “When we provide the diets to these types of hatcheries in our Australian market we find that better particulation of the faeces can reduce dissolved nutrient discharge as the faeces can be settled out and collected. For hatcheries that have limitations with regards to the output of nitrogen and phosphorus, RC diets offer significant advantages.”

With this in mind, and also with broodstock being increasingly reared in freshwater flow through and RAS systems, Vitalis SA, Skretting’s prime broodstock feed, includes the RC specific functional ingredients. “Vitalis SA RC has been introduced to our market with the ever increasing demand for more environmental control over broodstock production, hence more broodstock reared in RAS systems” explains Nicole.

Not only have RecircReady diets become an integral part of smolt production in recirculation systems in Tasmania, but are now more broadly used in salmonid hatcheries in New Zealand and mainland Australia. Additionally, the success of these feeds has sparked interest in other sectors of aquaculture production; for example some Australian barramundi is produced in RAS systems, and RC product is being used in these very successfully.

Roei concludes “The RecircReady hatchery range has been an excellent success story globally. Through rigorous R&D, Skretting has arrived at RC diets that deliver optimal results for RAS systems. The net result is that we have found a solution that can ultimately help farmers improve their profitability.”

Skretting Australia’s RecircReady range for Atlantic salmon

<table>
<thead>
<tr>
<th>Product</th>
<th>Pellet size (mm)</th>
<th>Production stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutra RC</td>
<td>1.2</td>
<td>Fry and parr in fresh water</td>
</tr>
<tr>
<td>Nutra Supreme RC</td>
<td>2.3</td>
<td>Smolt in freshwater</td>
</tr>
<tr>
<td>Vitalis SA RC</td>
<td>9.0</td>
<td>Broodstock in freshwater</td>
</tr>
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Salmonid grow-out systems tend to be open to the natural environment, which exposes the fish to a variety of challenges to the gills. Launching in 2015, new Protec Gill uses functional ingredients that support and shield the gills when confronted with such events, enabling the fish to cope better and recover faster.

Gill disorders have become one of the most serious and widespread causes of mortality among farmed salmonids. While amoebic gill disease (AGD) has grabbed the headlines in recent years after impacting production sites not only in Australia, but also across Europe and Norway, it is by no means the only gill challenge that fish farmers face today. Situations are further complicated by a long list of possible causative agents, including jellyfish, phytoplankton, bacteria, viruses and parasites. Insults from any one of these agents can often lead to respiratory problems, stress, and subsequently death.

Developed by the Skretting Aquaculture Research Centre (ARC) in Stavanger, Norway, new Protec Gill builds upon the knowledge and expertise that came from delivering other Protec solutions to provide enhanced gill support.

"We have taken all the appropriate elements of Protec, such as strengthening gut health, supporting the fish’s resistance to bacteria and providing a greater level of antioxidants, and then advanced the product to further address gill-related challenges. And crucially, Protec Gill supports the gills regardless of the challenge," explains Truls Dahl, Global Product Manager for Skretting’s Health Feed.

FUNCTIONAL INGREDIENTS

Thanks to on-going functional feed research at ARC, which has been influenced by invaluable input from commercial fish farmers, Protec diets contain a wide range of novel ingredients together with optimised doses of vitamins and minerals that have been shown to support the immune system.

They act in synergy to fight the negative effects of stress in fish, caused by factors including disease, handling, transport and vaccinations, and they modulate specific parts of fish immune systems to respond better when dealing with infections. For salmonids, Protec has proved particularly effective preparing the fish for stressful situations and is contributing to a reduction in the mortalities resulting from extreme environmental conditions. It is also being used to improve the healing capacity of skin and to reduce the impact of several diseases.

With the addition of very specific active ingredients, Protec Gill builds on these existing benefits making it more suitable to supporting fish that are dealing with gill challenges.

While the product is being launched into salmonid markets this year, work on the formulation began more than three years ago, in particular focusing on ingredients that support gill function, either through oxygen intake or tissue protection. ARC researchers also discovered that diet can influence some of the inherent properties of fish mucus, and that fish fed these diets also had significantly reduced mortalities after exposure to amoeba that cause AGD.

"Together with feeding trials in Norway, this research provided some excellent documentation that showed certain dietary components can help to further enhance gill condition," says Dahl. "The secret to Protec Gill is the way that these functional ingredients work together as a package to support the gill. On their own, the ingredients don't make a great deal of difference, but when combined very precisely they showed throughout the trials that they reduce fish mortality."

In following this broad-spectrum approach throughout the development process – from laboratory to trials to market – ARC has arrived at a diet that can be used more suitably to supporting fish that are dealing with gill challenges.

In addition, laboratory work has been done on testing whether functional feeds had an influence on the growth of the amoeba causing AGD. The effects of many combinations of functional ingredients and their response on the mucus of fish fed these functional feeds were examined. This work was done in partnership with Dr Astrid Holzer and her team at the International Institute of Parasitology and the Biology Centre of the Academy of Sciences of the Czech Republic. ARC has also conducted several AGD challenge trials with Dr Barbara Nowak at the University of Tasmania.

As is the case with other Protec protocols, Protec Gill is a proactive health diet, which means that ARC recommends it is used by fish farmers before they see any signs of gill disorders to give the fish some protection prior to the onset of a challenge and then throughout the course of that event to limit the potential impacts.

In Australia, we will be launching Protec Gill ready for the coming summer. For further information please contact Nicole Ruff (nicole.ruff@skretting.com).
The foundations have been laid and the tanks are starting to be put in at the $6 million Experimental Aquaculture Facility (EAF) in Taroona. The facility will contain 12 x 2500L tanks and 12 x 7000L experimental tanks. The 7000L tanks will be laid out in two separate rows of 6 tanks. A novel aspect of the system will be its ability to be run at two different temperatures whilst maintaining the same water chemistry. State of the art equipment will be installed to enable a high quality, functional system.

The experimental tanks supplied by Tasmanian company Y-not fibreglass are twin skinned with vacuum formed foam insulation and a unique slide away lid customised for LED lighting and Betten auger feeders for feed trials. Fresh By Design are extremely proud to be involved with the EAF facility at IMAS, working alongside IMAS/UTAS/SEMF over the past 18 months. It has been wonderful to see everyone’s hard work starting to come to fruition.

Commissioning of the EAF recirculation systems will begin in August.

On the 17-18th September, the New Zealand Aquaculture Conference will be held in Nelson. The theme for this year’s annual conference is “Farming Goodness - a resilient and prosperous sector”.

Skretting Australia is proud to be a silver sponsor of this event and we will be attending the conference in September. For more information visit http://aquaculture.org.nz/farming-goodness/

Skretting Australia is holding its first AquaScience forum this August. Our ambition is to run this seminar every second year with the vision of sharing with you the latest global knowledge available from our researchers at Skretting Aquaculture Research Centre, guest scientists and industry professionals to help you to continue to grow an economic and sustainable aquaculture business.

This year we will be focusing on the salmonid industry in Australia and New Zealand. AquaScience will be held in Hobart on Tuesday 11th August, and Nelson on Friday 14th August.

AquaScience is an innovative forum for managers, technical staff and operational staff working in the aquaculture industry.

AquaScience is an opportunity to gain a greater understanding of the latest nutritional developments for aquaculture, including ingredients, feed products and feed technologies.

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RecircReady is the dedicated feed range from Skretting for recirculating systems. Thanks to the use of special feed components, water stability and particle size, distribution of faeces is increased which leads to improved filtration efficiency. RecircReady diets are available for hatchery and ongrowing production systems. For more information, please contact your feed consultant.