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Aquafeed Horizons to focus on processing and formulation advances

The 11th Aquafeed Horizons Asia Conference, taking place on the first day of VICTAM Asia 2018, will bring together fish and shrimp feed processors, nutritionists, buyers and other industry professionals from throughout the region and beyond, to learn about the latest developments in aquafeed production.

Extrusion technology

Generally, fish feed, and increasingly shrimp feed, is produced by extrusion. This complex and nuanced technology is the focus of the processing talks at Aquafeed Horizons Asia 2018. Different types of feed are subject to different demands, for example, the feed's functionality on fish farms in terms of floatability or sinkability and the pellets' durability to assist mechanical handling without generating fines. Changing trends in raw materials also give new challenges to ensure that extrusion technologies and process control are developed to adapt accordingly, Thomas Ellegaard Mohr will tell delegates. According to Rob Strathman, factory performance is hindered by inflexible and unreliable hardware and software used in the extrusion systems of today. However, we can redesign the systems of the future, allowing significant improvements in factory performance to be realized. He will point out that he need to find efficiency in every aspect of production has driven other manufacturing industries to dramatically change course. The future of aquafeed production, he will say, will be digital.

Micro aquafeeds, in the of 0.5mm to 1.2mm dia. range, are required in the nursery phase of aquaculture. Their manufacture involves a series of meticulous steps to be followed, from the selection of high quality ingredients to specific grinding, sifting, mixing, precision twin screw extrusion and optimal drying process. Ramesh Gangatharan will explain how advanced computer controls, variable frequency drives, unique die designs and specially selected dryer screens all contribute to a smooth process at high production capacities. In-line moisture and density monitoring systems can be fixed at critical points to monitor the production

process so as to minimize production of out of spec product and to have a final product which is uniform in size, shape and density.

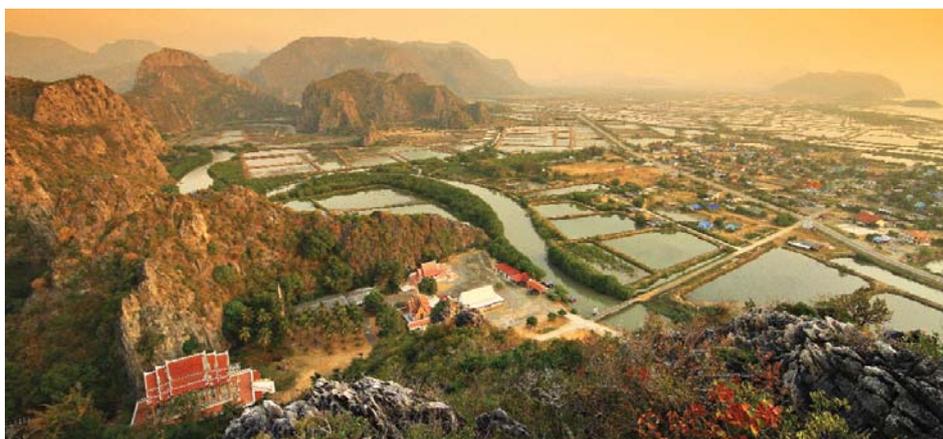
Recent research on the drying of extruded feed, particularly as related to technical product quality, have identified a connection between drying parameters and mechanical durability. The initial phase of drying is important to avoid early and spatially uneven glass transition following evaporative cooling. It follows that high air velocity, high temperature and high humidity are recommended. Obviously, extruded feed products start to flash off and dry, immediately when exiting the extruder. Hence, focus needs to be put on the design and operation of the different transport mechanisms, immediately upstream the dryer.

Validated model simulations visualize how many existing airlifts and conveyor belts could damage the pellets when transported to the dryer. Different process design options for new as well as existing production lines, will be presented by

Anders Fjeldbo Haubjerg, PhD., and compared in terms of energy efficiency, capital and operational expenditure, impact on mechanical durability, flexibility and hygienic design. The airlift using heated air is superior for durability of the product for existing production lines. Energy efficiency can optionally be optimized by invoking recirculation of the transport air. For new production facilities, process designs facilitating stacked dryer and extruder layout are superior.

Mycotoxins

No conference in Asia Pacific would be complete without addressing the threat of mycotoxins. There is an increasing trend towards plant ingredients in aquaculture feeds, and a commensurate rise in the risk of mycotoxin contamination. These toxins are produced as secondary metabolites by fungi and can have serious detrimental effects on fish and shrimp, ranging from mortalities in severe cases, to economic impacts such as reduced growth, reduced



Freshwater marshes at Khao Sam Roi Yot National Park, Prachuap Khiri Khan, Thailand, converted into shrimp farms. Photo: Kosin Sukhum via Wikimedia Commons

immunity, decreased feed efficiency. They can be caused by a single mycotoxin, or as is more common, by more mycotoxins working together synergistically, causing even more damage. Clinical signs of mycotoxicosis can easily be overlooked or misinterpreted, often leading to a wrong approach in dealing with the negative effects, Maarten Jay van Schoonhoven will say. Knowledge and awareness of the role of mycotoxins in aquaculture feed production is necessary, just as adequate strategies with a wide spectrum are necessary to deal with mycotoxin risk management.

Replacing fishmeal

New technologies are emerging to take on the growing opportunity to replace fishmeal in whole or in part. David Tze will argue that given the relative simplicity and efficiency of microbes, compared to reduction fishery species, plants, or insects, it makes sense to consider the merits of various microbial single cell protein technologies. These newer technologies include fermentation of bacteria, microalgae, yeast, and other fungi. The substrates may be purchased or received as waste streams. Those inputs might be solid, liquid, or even gas. But there are questions: What challenges will these new technologies face as they break from the lab and race to scale up to commercialization? What advantages does each have? Can any be economically produced? If so, what global scale are they likely to achieve? What might be the effect on the feed industry and players within it?

Insects are a natural source of nutrients for many fish species and can be produced sustainably. The EU has approved the use of processed insect proteins in aquaculture since 1 July 2017 as it is convinced this new feed ingredient can be produced in a safe manner and offer the quality needed for robust performance and health of the fish. Tarique Arsiwalla will focus on the use of insect proteins in diets for shrimp, Atlantic salmon and trout. Trial results will be shown as well as first commercial use of the products in Europe. The opportunities for the Asian market include the use of not only insect proteins, but also insect lipids in diets for young animals and challenged species. The potential for antibiotics reduction will also be touched upon.

Functional feed

The optimal nutrient profile of a shrimp feed depends on many factors, including the culture density, environmental conditions (temperature, salinity, oxygen, etc.), productivity of the pond water, the stability of the feed, feeding method, frequency, etc. These factors often differ depending on the season, region, farm or even pond, which makes the selection of the ideal feed rather

a complex and often unstable decision for the farmer. As a result, research in optimizing feed formulations under practical conditions continues to be a major objective for feed producers. Also, we can expect a wide variety in nutritional specifications among commercial shrimp feeds as composition may depend on the target market.

Increasing cost and fluctuating availability of raw materials in combination with an increasingly competitive market is demanding a creative mind from the shrimp feed formulator. The nutritional strategy is key to maintaining or gaining market share. Aside from that, diseases like white spot, vibriosis and white gut/faeces are an emerging risk during the production cycle of shrimp in India and require good nutritional support to the animal. Alexander van Halteren will present a study that investigated the different nutritional strategies in commercial shrimp feeds in India during 2016, when the number of shrimp feed suppliers increased sharply. Feed samples of 8 major brands were collected in the market and analyzed for proximate composition as well as a number of essential nutrients (amino acids, phospholipids, cholesterol, n-3 highly unsaturated fatty acids). Some of the nutrient levels detected during the survey, revealed the potential for functional feed additives to optimize nutrient utilization in shrimp feeds in India.

Beneficial bacteria, probiotics, are becoming increasingly popular in aquaculture. Amongst other benefits, probiotics can boost immunity, improve disease resistance, reduce feed conversion ratio, improve growth performance and survival and improve water quality. The benefit obtained is largely dependent on the probiotic formulation. Different probiotic strains have different modes of action; thus, they can bring different benefits to the host. For example, *Bacillus* spp. are capable of producing enzymes contributing to improved digestibility and feed conversion, whereas lactic acid bacteria (LAB) have functions in intestinal colonization and immunity. However, since probiotics are 'live' microbial components, they are sensitive to heat and pressure, which makes their inclusion in aqua feeds difficult, regardless of whether pelleting or extrusion technologies are used. Generally, post pelleting application (PPA) is necessary. Benedict Standen, PhD, will tell delegates how, using PPA, a novel application for

probiotic usage in fish and shrimp feeds has been developed that guarantees high probiotic viability without compromising the shelf life of the compound feed. This presentation will discuss the benefits of in feed probiotics and summarize results from recent trials, including probiotic application at the feed mill.

Applying innovative solutions such as immunomodulation through nutrition and the use of bioactive peptides as a functional, high-quality source of hydrolyzed protein can contribute to achieving health benefits in marine species. The beneficial effects of dietary nucleotides of yeast origin and bioactive peptides from intestinal mucosa have already been demonstrated in several studies in shrimp, salmon, tilapia, meager and sea bream among other species. Nonetheless, further research studies are still warranted. Francisco González will discuss scientific studies currently focused in evaluating the effects of bioactive peptides on growth, nutrient utilization, digestibility, intestinal health and meat quality of rainbow trout (*Oncorhynchus mykiss*) fed with high levels of vegetable protein, and the effects of dietary nucleotides in white shrimp (*Litopenaeus vannamei*) affected by Acute Hepatopancreatic Necrosis Disease (AHPND). Besides that, new product developments are also undergoing and should soon lead to specific formulations for other marine species of high commercial value, such as sea cucumber.

In recent years, there has been increasing attention to natural immunostimulants or organic acids or other bio-active compounds for antibiotic free production. Immunostimulants are naturally occurring compounds that modulate the immune system by increasing the host's resistance against diseases caused by pathogens under duress. Several products such as beta-glucans, chitins, mannoproteins, peptidoglycans, alginates, bacterial compounds (lipo-polysaccharides - LPS) and some phyto-genic compounds are being used as immunostimulants. Kabir Chowdhury, PhD will cover mainly the stress related factors in major farmed species and some relevant immunostimulatory solutions available today to the industry.

● Aquafeed Horizons Asia is Aquafeed.com's international technical conference. For full information, visit: <http://feedconferences.com>



About the author

Suzi Dominy is the founder and publisher of Aquafeed.com. She brings unique insight and depth of experience, gained over three decades in professional feed industry journalism and publishing. She can be contacted at editor@aquafeed.com