

Increasing Protein in Fishmeal

Rendering is often referred to as the original recycling process. It converts non-edible animal tissues into stable, value-added processed animal proteins that provide a nutritional source of feed for livestock, domestic animals (e.g., dogs and cats), and aquaculture.

Today, 40 percent of global seafood consumed comes from aquaculture farms and the market is growing every year. Seafood raised in aquaculture farms is expected to increase 62 percent by 2030. Fish raised in these high-density, confined farms require quality fishmeal with high protein levels to promote optimal aquaculture fish growth and health. Wild captured fish (60 percent of global fish consumption) are able to source their own food, but farmed fish require feeding of high protein, healthy digestible foods in order to survive and grow. These farms are primarily located in caged areas of saltwater or freshwater lakes, ponds, and rivers, but can also be found in excavated earthen ponds and concrete or plastic tanks.

The growing consumption of aquaculture farmed fish has resulted in greater demand for high-protein fishmeal, one of the major ingredients in fish food. Higher protein premium fishmeal is important because it promotes optimal fish growth and health, especially in young fish as they have a high energy demand and need more protein-rich (60 to 72 percent) feed. Often times, the protein levels in fish raw material that is rendered for fishmeal does not meet the high protein levels needed for aquafeed. This forces producers to sell their fishmeal as lower-value feed ingredients for livestock or pet food. There is a technology, however, that can convert fishmeal with lower protein levels into higher protein meals that can be sold for premium-value aquafeeds. That technology is the Sturtevant Whirlwind air classifier.

Proteinas Marinas y Agropecuarias (Protmagro), a leading supplier of fishmeal in Mexico, recognized that high-protein fishmeal sells at a premium price to standard fishmeal. The company wanted a cost-effective way to produce these products while avoiding the conventional practice of using vibrating or high-frequency screens, which are susceptible to costly maintenance. As the company researched its expansion, it discovered Sturtevant's unique approach of air classification, a technology that would allow them to separate the fines, converting regular fishmeal into a premium high-protein product. At the same time, the coarse fraction would still contain enough protein that it could be sold as regular grade fishmeal for aquafeed, pet food, or livestock feed.

Located in Guadalajara, Mexico, Protmagro was established in 1993 in the Mexican fishmeal and oils sector. In recent years, it has successfully expanded as an animal



Whirlwind air classifier

protein meal, oil, and fat supplier for national and international markets, as well as in new divisions such as special meals, bio-fertilizers, and low ash meals. As part of its expansion, Protmagro opened a warehouse in northern Mexico and plans to open another in the south, in the Peninsula de Yucatan area, to supply the growing aquaculture, feed, and pet food markets.

Protmagro is the first company in Mexico and Latin America to operate a Sturtevant Whirlwind air classifier for animal proteins. They selected Sturtevant due to it being a global supplier of air classifiers for many types of rendered animal meals.

“We buy rendered fishmeal and poultry meal, but there is not always availability of high percentage protein meals so we started looking for technology that will guarantee our fishmeal products always have high protein and our petfood products always have low ash,” stated Lilia Marin, chief executive officer of Protmagro. “We talked to three machine manufacturers, but we selected Sturtevant because their senior product manager clearly explained their experience with rendered animal meals and this convinced us that its benefits will also work for us.”

Protmagro also appreciated that the Sturtevant Whirlwind air classifier is made in the United States from quality materials and hand crafted to meet the company's needs. “It was installed quickly and is easy to operate,” Marin continued. “We are now able to sell air classified products with higher protein and lower ash for aquaculture, petfood, livestock feed, and fertilizers. Due to higher sales value of these products, the investment in the Whirlwind air classifier will be paid back in less than three years.”

Two examples of high-value aquafeed products Protmagro produces with the Whirlwind air classifier are tuna fishmeal and sardine fishmeal. Table 1 shows examples of the starting quality of each fishmeal and the average results of the protein and ash content of the air classified meals.

In both meals, the Whirlwind air classifier increased the protein to a level that allows Protmagro to sell at a premium price for aquafeed. The output production rate of the high-protein tuna meal (fines) is 58.7 percent of the air classifier feed rate and the output production rate of the high-protein sardine meal (fines) is 60.9 percent of the air classifier feed rate (see table 2).

Air Classifier Specs

The Whirlwind air classifier features an internal fan and air recycle design that does not require auxiliary equipment (e.g., baghouses, cyclones, or ductwork) to capture the high protein-low ash fine product. A popular feature of the Whirlwind air

classifier is that the meal stays fluidized and the machine has minimal dead zones where high fat and sticky material can settle. This makes the air classifier both low in maintenance and reliable for continuous use because it does not have major clogging issues.

“If the fat levels get too high, we simply remove the cone and clean out the product that is stuck on the inside,” commented Marin. “We run the machine several hours a week, depending on demand for high protein or low ash products. We clean it each time that we change species of meals.”

Another feature of the Whirlwind air classifier is it can produce a wide range of low ash, high-protein products by

simply changing the quantity of selector blades. Once the best selector blade setting is determined, operators can dial in a speed adjustment using a variable speed drive to fine-tune the desired product specifications or to compensate for any unexpected changes in the composition of the raw materials (i.e., ash, protein, fat, moisture). In all cases, there is a controllable relationship between protein/ash levels and output yields of the fines fraction (lower ash/higher protein) and the coarse fraction (regular ash/regular protein).

The Whirlwind air classifier has only one motor that controls the entire machine and rotates a feed distribution plate that scatters the meal into an open area. The same

motor rotates an internal fan creating updraft airflow that accelerates finer/lighter protein particles, separating them from coarser/heavier ash particles. The motor also rotates a series of selector blades that reject some of the undesirable near-size ash particles. By using only one motor, the energy consumption is very low (approximately three to five horsepower per tons per hour of feed capacity).

The air classifier is available in various models and feed rate capacities. **R**

Table 1. Improvements in air classified tuna and sardine meals (%)

Product	Initial moisture	Initial fat	Initial protein	Initial ash	Final protein	Final ash
Tuna meal	6.85	9.82	61.00	19.30	65.11 (+4.11)	14.90 (-4.40)
Sardine meal	7.63	12.00	64.58	18.61	67.68 (+3.10)	15.67 (-2.94)

Table 2. Air classifier output production rates

Product	Feed rate (input)	Product rate (fines)– high protein/low ash	Product rate (coarse)– regular protein/ash
Tuna meal	3,000 kg/hr	1,760 kg/hr (58.7% output)	1,240 kg/hr (41.3% output)
Sardine meal	5,076 kg/hr	3,093 kg/hr (60.9% output)	1,983 kg/hr (39.1% output)

kg/hr = kilograms per hour

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WHIRLWIND AIR CLASSIFIER

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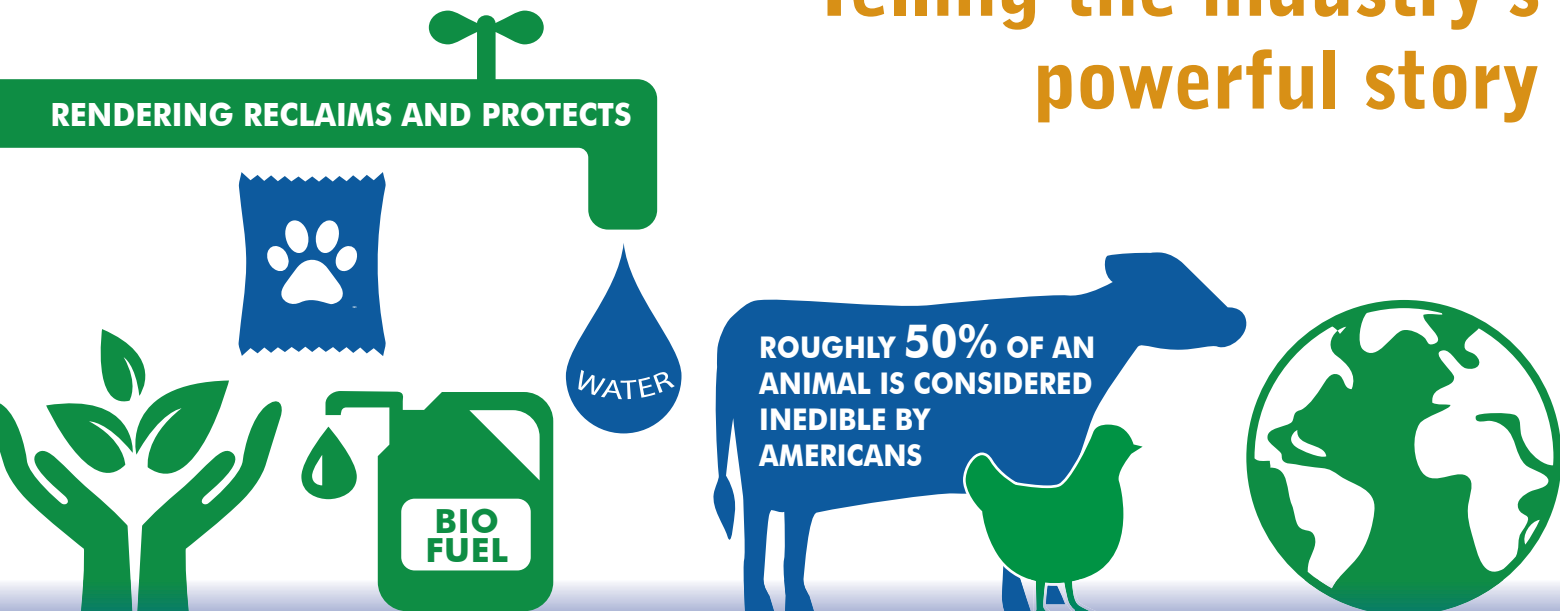
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Increasing Protein in Fish Meal

Renderers and Supporters to Safely Gather

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