Meeting the Nutritional Needs of Aquaculture

with Dried Distillers Grains and Next Generation Feed Products

Background on DDGs:

Distillers grains (DGs) often marketed as dried distillers grains with solubles (DDGS), are a co-product of the ethanol production process and an important source of energy and nutrients that continues to be produced in large quantities by the dry-grind fuel ethanol industry. They are rich in the protein, fat, minerals, yeast, and vitamins that animals need, making them a very popular feed ingredient for cattle, swine, poultry and aquaculture. From feathers to fins, these high protein, economically competitive feed products have great potential in production cycles.

These distillers grains are widely used as feed for livestock and are marketed as DDGS, modified distillers grains with solubles (MDGS), wet distillers grains with solubles (WDGS), or condensed distillers solubles (CDS or corn syrup). Approximately 40 million metric tons of DDGS are produced annually. While cattle account for nearly 80 percent of DDGs consumption (50 percent attributed to beef cattle and 30 percent attributed to dairy cattle), we recognize that aquaculture is also a very important customer of this co-product as 87,000 tons of DDGS are fed to U.S. aquaculture. With 90 percent of U.S. seafood imported, we acknowledge that there are huge areas of opportunity for domestic production as well as exports of DDGS and next-generation feed products.

Aquaculture & Distillers Grains:

There are multiple advantages to feeding distillers grains. Drying them increases shelf life, allowing DDGs to be transported longer distances. Distillers grains can also be sold wet and are generally more economical due to savings on drying costs. Unfortunately, given the pelleting need for aquaculture, feeding wet distillers is not an option at this time, though the yeast generated in fermentation is a very important functional component of the protein found in distillers feed products.

“Whilst they are rich in the protein, fat, fiber, minerals, yeast, and vitamins that animals need, making them a very popular feed ingredient for cattle, swine and poultry alike, it is important to acknowledge that these products were never designed,” says Pete Williams of FluidQuip Technologies. “They happened as a convenient method of utilizing the residual fermentation products. Such a chance design process does not always fit with current precision nutritional practices and much work has recently focused on improving the nutritional products,” he adds.

Where the Industry is Headed:

With many different species and species-specific needs being considered under the umbrella of aquaculture, next-generation DDGS products can provide unique benefits to this industry. One study, focused on HP-DDGS inclusion rates in Channel Catfish, found that fish fed diets at 20 percent inclusion had significantly higher average harvest weights than fish fed at 40 percent inclusion with no impact on survivability. Another study focused on European Sea Bass, found that HP-DDGS greatly improve the growth performance and feed conversion ration when fed at rates over 30 percent.

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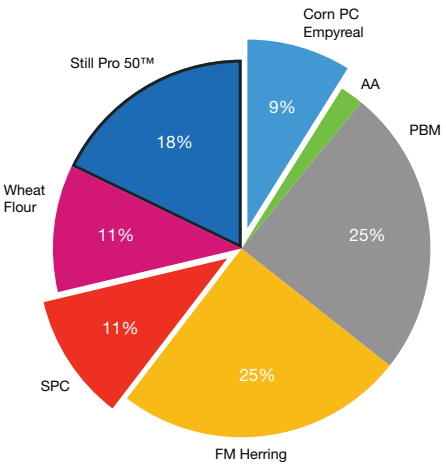
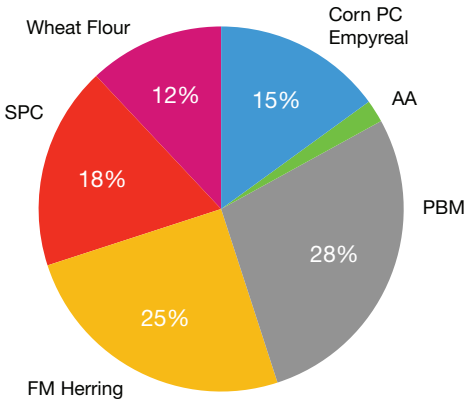
Additionally, a recent study has evaluated the use of a corn Fermentation Protein supplement SP50™ in diets for post-smolt Atlantic salmon (initial body weight 304.0±10.7g). Formulation with Still Pro 50™ up to 15 percent inclusion level, supported equivalent performance in terms of growth rate, feed intake and feed conversion ratio (FCR) of salmon, compared with a diet formulated to fully commercial specifications based on a high level of animal protein by-products plus expensive protein isolates commonly used in N. American aquaculture diets. Overall, Thermal Growth Coefficient, a value used by the industry to benchmark performance, was ≥0.169 (commercially highly acceptable) even at 20 percent inclusion of Still Pro 50™.

Test Diet Formulations with SP 50



Feed Conversion Ratio remained between 0.93 and 0.98 for all treatment groups, which is outstanding for fish of this size. Important to the aquaculture industry, there were no effects on whole-body composition, fillet pigmentation (redness and yellowness) and a range of blood metabolites. Overall the results demonstrate that existing and new developments in ethanol biorefinery products can play an important role in producing valuable protein supplements suitable for all classes of diet formulation for the aquaculture industry. Other studies have similarly supported the replacement of more traditional, more expensive feedstuffs such as wheat and soybean meal with DDGS products, and such work is being conducted at the National Corn to Ethanol Research Center. The National DDGS Library established at NCERC has provided a representative sample base to understand the nutritional and risk factors in DDGS produced from the corn to ethanol industry. Recent research found that DDGS can be easily included in tilapia diets at levels up to 20 percent as a practical replacement for soybean meal. It was found that this replacement can be made without jeopardizing tilapia growth performance, feed utilization, and proximate composition, while slightly reducing feed cost.

Commercial North American Control Diet



With ongoing research and feeding trials, resources and materials for producers and nutritionists are being developed and will continue to become more widespread.

It is important to note that while some ethanol plants may invest in the biorefinery technology and produce these new products, others may not, which presents an opportunity for aquaculture producers to continue using the traditional DDGS products available to them but also explore new options. While there is much more to come on next-generation feed products, it is important to remember the value of current distillers grains products as well as corn grain. Any new products will require ongoing research and feeding trials to determine species response and performance and communication within the industry to help producers make the choices that best serve their bottom line. For these reasons, the corn, ethanol and animal agricultural industries are co-dependent upon one another for their success and mutual prosperity. The National Corn Growers Association (NCGA) and its affiliates are proud to play an integral role with two important industries that impact the health of rural America.

References:

Goda, A. A. S., Srour, T. M., Omar, E., Mansour, A. T., Baromh, M. Z., Mohamed, S. A., ... Davies, S. J. (2019). Appraisal of a high protein distiller's dried grain (DDG) in diets for European sea bass, Dicentrarchus labrax fingerlings on growth performance, haematological status and related gut histology. Aquaculture Nutrition, 25(4), 808–816. doi: 10.1111/anu.12898

Tidwell, J. H., Coyle, S. D., Bright, L. A., Pires, L., & Rosentrater, K. A. (2016). Effects of Varying Levels of High-Protein Distillers Grains on Growth Performance of Channel Catfish, Ictalurus punctatus, and Post-Extrusion Feed Pellet Characteristics. Journal of the World Aquaculture Society, 48(3), 426–434. doi: 10.1111/jwas.12374

DDGS Produced from Illinois as an Ingredient in Nile Tilapia Feeds [PDF]. (n.d.). Accessed on July 14.

Research from the National Corn to Ethanol Research Center