

Aquaculture Research and Outreach.

The aquaculture industry is a major economic force in the state of Idaho contributing some \$110 million to the economy. That figure can be significantly increased. The ARS-funded aquaculture program at the University of Idaho is locally and internationally respected for the quality and relevance of its work to the industry.

There are two challenges in the farmed fish industry that the UI-ARS funded program is currently addressing. One is the rising cost of the two traditional components of fish feed, fish meal and fish oil. Fish meal prices more than doubled since 2007 from their 30 year average range of \$400-\$850 to as high as \$1900 per metric ton, and fish oil has seen similar increases since 2007. Both have reached limits of production, so further increases in aquaculture feed production using traditional levels of fish meal and fish oil are not sustainable.

The second challenge is maintaining the nutritional quality and human health advantages of fish fillets by providing omega-3 fatty acid content in fillets. Omega-3 fatty acids are supplied by fish oil, so replacing fish oil with sustainable plant oils can lower omega-3 fatty acids in fillets unless new strategies to maintain them are developed. Consumers benefit from eating fish by consuming omega-3 fatty acids in the fish. They have well-documented benefits for cardiovascular health, brain development and depression.

UI-ARS research is pursuing innovations that could have positive effects on both of these situations. Program goals include:

- Reduced dependency on increasingly expensive fish meal and fish oil through alternative feed ingredients from sustainable sources (e.g., soy beans, barley, wheat, corn, oats and canola).
- Development of fish feed inputs from Alaska's seafood processing byproducts to provide feed supplements that supply essential nutrients and protein missing in plant-derived ingredients and improve nutritional quality of fish fillets for human consumption.

ARS-UI researchers have tested new ingredient combinations to reduce fish meal in feeds to as low as 0% while maintaining rapid fish growth rates, and also to reduce fish oil as much as possible while employing novel ways to increase omega-3 fatty acid levels in fillets by using them in feeds at the end stages of the production cycle. Both of these efforts are combined with an aggressive selective breeding system for trout based on performance using plant-based feeds. Reports from growers indicated that UI genetically selected lines outperform non-selected lines by a significant amount when fed all-plant ingredient feeds.

Making changes in fish feeds must not result in higher levels of phosphorus or total suspended solids from indigestible feed components in hatchery effluent discharge water. Extensive research efforts at the University of Idaho have reduced phosphorus levels in feeds and allowed trout farmers to maintain production and meet new EPA-DEQ limits on phosphorus discharges from farms into the Snake River.



Consequences of Reduced Funding in FY11.

Funding is at \$293K for the plant feed and trout genetic selection program. The impact of reduced funding would be dramatic because 12 years of selective breeding has been completed and we are responsible for maintaining the improved trout germplasm that so many trout producers rely on. UI-ARS cooperates with industry to evaluate our selected trout in production settings. Further, Clear Springs Foods, the largest trout grower with half of all Idaho's production, maintains its own broodstock, which is being converted to UI/ARS broodstock. Nearly 30% of their broodstock are now ARS-UI fish. UI fish are superior in growth and feed utilization performance, disease resistance and body conformation to Clear Springs fish or other commercially available stock. Lower funding would reduce our ability to continue the selection program and transfer improved stock to industry, making them less competitive (i.e., fish would not grow as fast or be able to utilize low fish meal diets, therefore costing more).

Continued effort is also required to continue research to improve plant-based feeds. Fish meal contains components that are lacking in plant proteins and must be supplemented to feeds to enhance fish performance. Continued research is also needed to develop feeds for improved fish strains that increase efficiency of omega-3 fatty acid deposition using fish by-products from Alaska. further to ensure healthful farmed fish products Research results will be applicable to the entire Idaho and USA aquaculture industry, including trout, sturgeon, tilapia and catfish farmers.

For more information, please contact:

John K. "Jack" McIver, Vice President for Research and Economic Development
vpresarch@uidaho.edu | 208.885.6689 | www.uidaho.edu/research