NP 106 Strategic Plan
ARS Aquaculture Research

Program Vision

The vision for ARS aquaculture research and technology transfer is *to support a thriving domestic industry based on improved genetic stocks and scientific information on biotechnologies and management practices to ensure a high quality, safe supply of healthful seafood and aquatic products.*

Mission

The ARS National Aquaculture Program has as its mission:
- Understanding, Improving, and Effectively Using Animal Genetic and Genomic Resources
- Enhancing Animal Performance, Well-being, and Efficiency in Diverse Production Systems
- Defining Nutrient Requirements and Nutrient Composition of Feedstuffs and Expanding Alternative Ingredients
- Improving Health and Welfare of Aquatic Animals
- Improving Production Systems, Developing New Products, and Enhancing Product Quality.

Relevance

The ARS Aquaculture Program research strategy supports the following plans:

- ARS Strategic Plan for FY 2006 – 2011, specifically Performance Measures 2.1.2, 2.2.1, 2.2.2, 4.2.1, 4.2.2, and 4.2.5. (see http://www.ars.usda.gov/SP2UserFiles/Place/00000000/ARSStrategicPlan2006-2011.pdf),
- The Strategic Plan of USDA's Research Education and Economics mission area. (see http://www.ocfo.usda.gov/usdasp/usdasp.htm)
- The Joint Subcommittee on Aquaculture Strategic Plan for Aquaculture Research and Technology development.

Program Priorities

In planning and conducting aquaculture research, ARS will focus our efforts on several specific priorities:
- Safeguard and use genetic resources, including genetic and genomic databases and bioinformatic tools, to develop and make available to industry superior

breeding stocks to improve production, nutrient utilization, reproduction, product quality, and health traits.

- Extend the understanding of the physiology of aquatic animals, especially pertaining to growth, nutrient utilization, reproduction, and stress/welfare in order to expand producer control of these traits.
- Identify and exploit alternative protein and lipid sources and feeding strategies to optimize the use of sustainable materials and quality of products.
- Determine mechanisms of pathogenesis and disease resistance to enhance the host immune system and develop control strategies with broad protection to improve aquatic animal health.
- Develop new products and information, tools, and technologies that can be used to improve production system sustainability and environmental compatibility, while improving production efficiency and animal performance.

Anticipated Outcomes

We anticipate an aquaculture industry that produces a variety of aquatic species for food and recreation in a humane and environmentally sustainable manner. We envision reinvigorated coastal and inland communities engaged in aquaculture, providing high quality products, high quality jobs, and healthy foods, in other words, a vigorous domestic aquaculture industry that would reduce U.S. reliance on foreign imported seafood.

Specific outcomes targeted include:
- A vibrant aquaculture industry that produces over 25 thousand tons of several different aquatic species for food and recreation in a humane and environmentally sustainable manner.
- Development of a strong collection of genetic resources (*e.g.*, germplasm preserved from a broad genetic base, improved selectively bred lines supporting commercial populations, and genomic resources and phenotypic databases) for a variety of species, including rainbow trout, Atlantic salmon, Ictalurids, Moronids, yellow perch, and oysters (within 5 years), and extending to marine species such as cobia, black cod, and geoducks within a 10 year time frame.
- Physiological research programs identifying genes and pathways critical to improving production efficiency, reproduction, and animal welfare.
- Based on improved understanding of gene actions and integration of genetics with physiology, important economic traits will be better defined and more easily incorporated into selective breeding programs.
- Identification and development of a variety of non-fishmeal ingredients for diet formulation in major species that meet protein and lipid requirements and provide a healthful product for human consumption.
- Least cost diets developed through the understanding of nutrient requirements for various life stages, use of alternative protein and oil sources, and improved feed processing and feeding strategies. Use of material co-products from other industrial processes for feed development.
- The reliance on fish meal will be limited to early stages of fish development.

- An integrated health program that utilizes microbiology, immunology, genomics, molecular, predictive biology, environmental, and ecological principles to control diseases.
- Vaccines and highly specific targeted control strategies (such as RNAi) that are available to combat many health challenges, resulting in lower production costs and increased productive value.
- Healthy, nutritious products raised in a sustainable manner.
- Efficient systems that support high densities and do not restrict harvesting or require depuration due to uncontrolled water chemistry and are available for raceway, pond, and RAS formats.
- Research programs that are committed to the sustainability of high quality aquatic animal products while employing environmental stewardship.
- Integrated aquatic animal production systems that promote energy, water, and environmental conservation.