



INDUSTRY BRIEFS

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THE U.S. MARINE SHRIMP FARMING PROGRAM

The U.S. Marine Shrimp Farming Program is a congressional initiative administered by the USDA/CSREES. It is an integral part of their aquaculture development effort and is executed by the US Marine Shrimp Farming Consortium.

**Good News for U.S. Farmers!!
Environmental Defense
selects U.S. Farmed Shrimp as
"Best Eco-Choice" P4**



From left. Craig Browdy and Charles Hamilton of South Carolina DNR and Bob Bullis of ABN show off their freshly harvested organic shrimp at the Waddell Mariculture Center in Bluffton, SC.

Advanced BioNutrition Corp. partners with the South Carolina Dept. of Natural Resources to harvest shrimp raised on an all-organic diet.



Advanced BioNutrition (ABN) recently completed the first large-scale trial of a shrimp feed formulated with all-organic ingredients. The 20-week growout trial was conducted by ABN in cooperation with the South Carolina Dept. of Natural Resources and other partners.

After formulating replacement diets with ABN's omega-3 containing algal meals, University diets were first tested by Tzachi Samocha at TAES in

Corpus Christi. Once the replacement strategy had been proven at laboratory scale, Bob Bullis, ABN's Director of Animal Health and Regulatory Affairs, arranged for two tons of shrimp feed to be specially prepared using all-organic ingredients. Twenty weeks and three hurricane warnings later, 3,000 lbs of shrimp were harvested from the ponds at South Carolina DNR's Waddell Mariculture Center in Bluffton, SC.

"To the best of our knowledge, this is the first commercial-scale trial of a shrimp feed specifically formulated

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*Anthony C. Ostrowski, Ph.D.,
USMSFP Consortium Director*

Successful Strategies

The 2004 harvest season ended a six-year run at record production levels in the U.S. Fundamental changes and successful strategies within our domestic farming industry promise to set new shrimp aquaculture standards and improve the outlook for the future. While our more traditional shrimp farming states such as Texas and South Carolina have taken hits, successful strategies are being employed to expand inland

and intensive farming in Arkansas, Alabama, and Georgia. The industry has grown geographically over the last ten years, up from production in only three states in 1993 to 12 states currently involved in some sort of production or pilot scale projects. Potential for growth also exists and is occurring for U.S. broodstock suppliers as shrimp production worldwide relies more and more upon *L. vannamei*. It is estimated that the demand for broodstock in Asia alone is over 1 million animals. The key is controlling domestic germplasm.

The Environmental Defense organization has designated U.S. farmed shrimp as a Best Eco-Choice in their seafood pocket guide (see page 4). These recommendations present U.S. shrimp as a wholesome, healthy alternative to foreign imports rated as a Worst Eco-Choice. All components of a successful strategy to compete with foreign imports appear to be falling into place. Our work is still cut out for us, as we will continue to battle restrictive regulations and continued foreign competition. Our industry needs to leverage advantages, continue to be innovative, and promote the unique qualities of U.S. farmed shrimp, broodstock, and shrimp products.

In this issue of Industry Briefs, we examine just a few of the successful strategies that are beginning to emerge in the country that promise to set new standards for the industry. Our feature article examines Consortium interactions with the commercial sector on testing of organic feeds for production. Organic shrimp are being promoted in Florida and Texas, promising to tap into that niche segment of the market. Arkansas has the well-planned and executed efforts of Jackson Currie putting Arkansas shrimp on the map. His innovative cooperative approach and brand marketing should serve him well in his expansion efforts. We also examine some new and successful approaches being done within the Consortium employing a new two-phase hatchery approach in Hawaii for production of better quality postlarvae, and the continued success at the super-intensive production system in South Carolina. The industry as well as our research is changing as it meets the challenges of foreign production strategies. This will prepare the industry to take on the challenges of the future.



The US Marine Shrimp Farming Program is a congressional initiative administered by the USDA/CSREES. It is an integral part of their aquaculture development effort and is executed by the US Marine Shrimp Farming Consortium:

- Oceanic Institute**
Waimanalo, HI
- Gulf Coast Research Laboratory**
University of Southern Mississippi
Ocean Springs, MS
- Tufts University**
School of Veterinary Medicine
North Grafton, MA
- Waddell Mariculture Center**
Department of Natural Resources
Bluffton, SC
- Texas Agricultural Experiment Station**
Texas A&M University
Port Aransas, TX
- University of Arizona**
Department of Veterinary Science
Tucson, AZ
- Nicholls State University**
Department of Biological Science
Thibodaux, LA

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USMSFP Consortium Research Report FY 2004 summary now available online at: <http://www.usmsfp.org>

Topics include:

- FY04 Highlights and Accomplishments
- Stock Improvement
- Disease Control
- Sustainable Culture Technology
- Product Quality and Markets
- Industry Support
- Information Dissemination

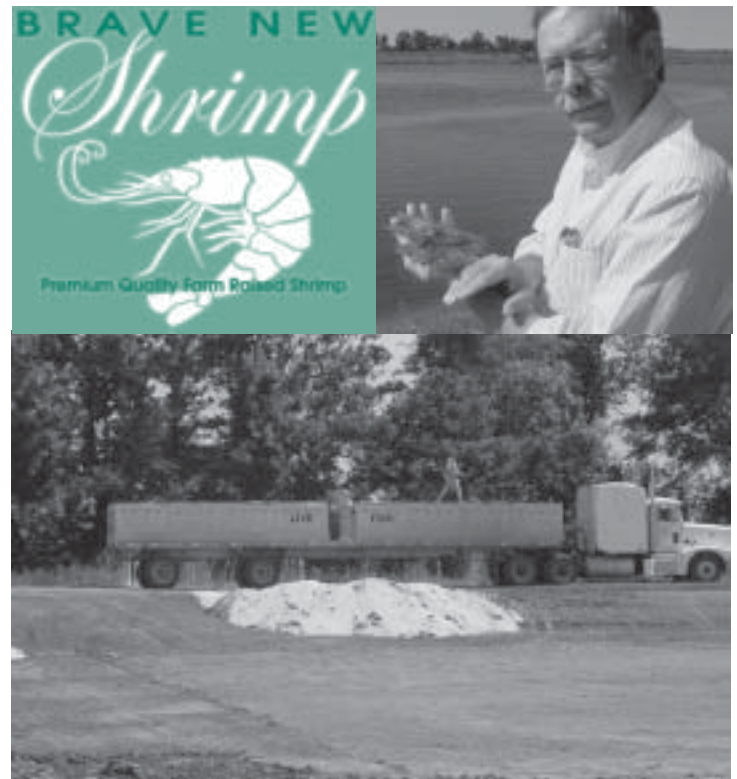
Arkansas farm and up-scale restaurant join forces in successful marketing strategies

In today's health conscious culture, we are all concerned about the source of our food and there is a very special new shrimp on the market in Arkansas. Jackson Currie, of Wilmot, Arkansas, is raising Pacific White Shrimp (*Penaeus vannamei*) and has just harvested his most successful crop to date.

Currie understands that raising a healthy crop is only the first step in a successful marine shrimp venture. So he has joined forces with Peter Brave, Inland Natural Seafoods vice-president of marketing and owner of an up-scale restaurant, Brave New Restaurant. The company is marketing its product under the "Brave New Shrimp" brand.

Brave New Shrimp spend their juvenile through adult lives in a controlled environment. They are not exposed to marine pollution and their harvest does not contribute to the over-fishing of the oceans. They are fed the best feed available, and they never come near any growth hormones or antibiotics. When harvested, they are quickly frozen with no preservatives. Using indigenous plants to provide biological filtration enables Inland Natural Seafoods to recycle almost all of its water. Jackson Currie and Peter Brave plan to use every part of the shrimp; customers don't have to deal with the heads, but they will be put to good use, too. They are researching ways to incorporate a renewable energy source, wind or solar, into their production system. Inland Natural Seafoods is proud of this alternative to "seafood".

The company plans to expand the acreage for next year, possibly up to 50 acres, and eventually wants to



move from being a local and regional supplier of restaurants and retail markets to a national player in the domestic shrimp market, which Currie says shows great growth potential.

Along with Little Rock, the company is eyeing Memphis and Nashville in Tennessee as the first paces it plans to sell its shrimp. "We've got a five-year plan and hopefully after five years of harvesting, we'll produce about 700,000 pounds of shrimp. At that point we would start thinking about going outside the regional approach," Brave said.

For more information go to:
<http://www.bravenewshrimp.com>

South Carolina greenhouse yields a big harvest in a small space



By Craig Browdy and Heidi Atwood. Waddell Mariculture Center has completed harvest of the fourth run in the pilot 282m² biosecure super-intensive raceway system. The results of the latest run indicate that a growth rate of nearly 1.5g/wk can be maintained in this system, at densities in excess of six kg/m², up to a harvest weight of almost 26 grams. This current run suggests that target production rates in financial feasibility analyses can be raised well above the 3 kg/m² projections which were thought to be optimistic a few short years ago. Research objectives continue to push the envelope on production rates to generate and explore challenges which will be encountered as the system is stocked for higher levels of production. The observed reduced survival and higher FCR may have been the result of low pH associated with high oxygen input and corresponding CO₂ buildup. Additional investment into engineering solutions for degassing while controlling heat loss will be needed. Third generation

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Environmental Defense rates U.S. farm-raised shrimp as "Best Eco-Choice"

- Worst Eco-Choices**
- Caviar – wild paddlefish and sturgeon eggs
 - Chilean seabass/toothfish
 - Cod – Atlantic
 - Grouper
 - Halibut – Atlantic
 - Marlin
 - Monkfish/goosefish
 - Orange roughy
 - Rock cod/bocaccio/Pacific rockfish
 - Salmon – farmed or Atlantic
 - Shark
 - Shrimp/prawns – imported
 - Skate
 - Snapper
 - Swordfish
 - Sturgeon – wild
 - Tilefish
 - Tuna – bluefin



- Best Eco-Choices**
- Abalone – U.S. farmed
 - Anchovies
 - Arctic char – U.S. and Canadian farmed
 - Catfish – U.S. farmed
 - Caviar – farmed paddlefish and sturgeon eggs
 - Clams – butter, geoducks, hard, littlenecks, Manila
 - Crab – Dungeness, snow from Canada, stone
 - Crawfish – U.S.
 - Halibut – from Alaska
 - Herring – Atlantic sea herring
 - Mackerel – Atlantic, Spanish
 - Mahimahi/dolphinfish – U.S. from the Atlantic
 - Mussels – farmed blue, New Zealand green
 - Oysters – farmed Eastern, European, Pacific
 - Sablefish/black cod – from Alaska
 - Salmon – wild from Alaska
 - Sardines
 - Scallops – farmed bay
 - Shrimp – Northern from Newfoundland, **U.S. farmed**
 - Spot prawns
 - Striped bass/Atlantic rockfish – farmed and wild
 - Sturgeon – farmed
 - Tilapia – U.S.
- Red text indicates a consumption advisory due to mercury, PCBs, dioxins or pesticides. For detailed advice, visit www.oceansalive.org/eat.cfm



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Cover illustration: www.chartingnature.com

Environmental Defense doesn't mince words when telling the public what seafood is eco-friendly. U.S. farm raised shrimp has joined other healthy eco-choices in the recently release Environmental Defense Pocket Seafood Selector targeting best and worst seafood choices.

As our cover story relates efforts are underway to reduce the reliance on fishmeal even further with research into 100% organic products.



From left, ABN's Bob Bullis and South Carolina's Craig Browdy holding representative samples of the harvested shrimp.

Advanced BioNutrition Corp. partners with the South Carolina Dept. of Natural Resources...continued from P1



From left, ABN's Bob Bullis, South Carolina DNR's Craig Browdy, and Al Stokes weigh of shrimp harvested from a Waddell pond.



A South Carolina DNR worker oversees draining the shrimp pond for harvesting at the Waddell Production facility.

Average production figures representing three .10 hectare ponds per diet

	Commercial	Organic
Total wt.(kg)	1367.4	1377.8
Production (hg/ha)	4558.0	4593.0
Mean harvest wt. (g)	18.7	19.2
Survival	98.8	93.8
FCR	1.37	1.37

to meet the anticipated high standards that will be necessary for Organic certification," said Bullis. He said that the feed conversion ratio and survival of shrimp raised on ABN's diet were identical to those of shrimp raised on commercial feeds containing fish oil and fishmeal.

"This is an exciting accomplishment that could give U.S. shrimp farmers an edge against foreign competitors."

The shrimp trials are part of ABN's cleaner and safer seafood initiative, which addresses three major concerns facing today's American seafood consumer:

- **Environmental Sustainability:** By enabling the farming of marine animals on land with no ingredients

from the marine system, ABN provides solutions for the long term sustainability of the marine environment.

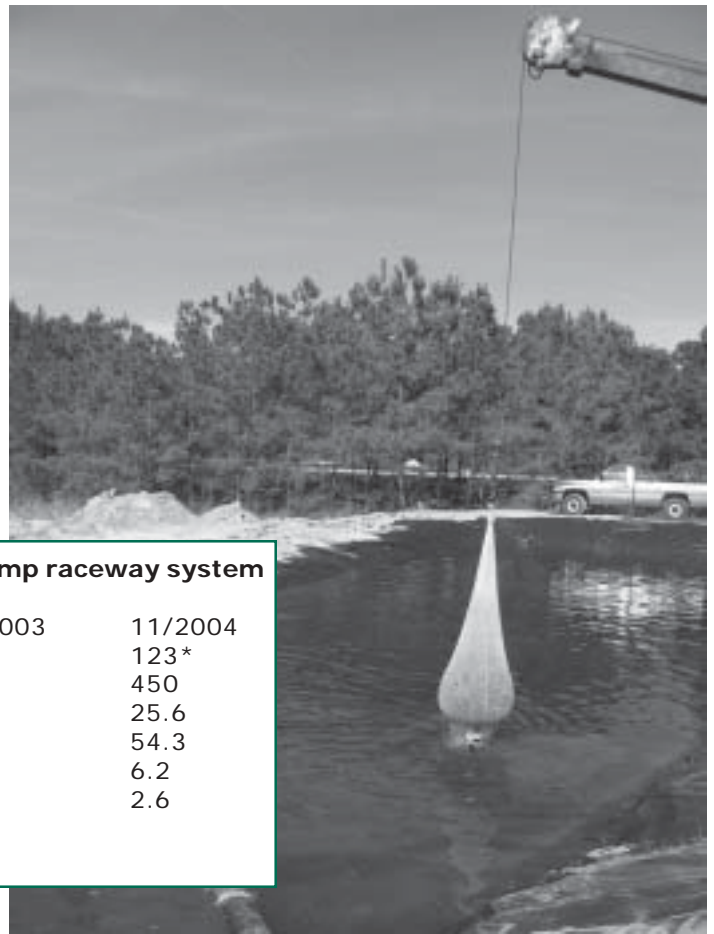
- **Elimination of Toxins in the Human Diet:** ABN's feed solution is good news for pregnant and nursing mothers who will be able to enjoy seafood without worrying about "back door" contaminants (especially mercury) associated with fish oil and fishmeal.

- **Improved Human Nutrition:** Unlike other aquaculture feed formulations that fail to provide DHA, ABN's diets maintain the critical HUFA omega-3's in animals intended for human consumption.

South Carolina greenhouse yields a big harvest...continued from P3

feeds supplied by Zeigler Bros Inc. and growth line PL bred at the Oceanic Institute and hatched in cooperation with Harlingen Shrimp Farm hatchery contributed to the fast growth, high rearing densities and large harvest size achieved.

In general the results of these trials and those underway at other consortium institutions bode well for commercialization of these technologies. A workshop planned for January will bring together economists, engineers and biologists to fast track research aimed at facilitating transfer to the private sector. The tremen-



Harvest data from WMC 285m² super-intensive shrimp raceway system

	1/2002	3/2003	11/2003	11/2004
Days	140	76*	113	123*
Density	300	300	420	450
Mean Wt (g)	17.1	16.6	21.0	25.6
Survival (%)	55.2	91	79.5	54.3
Production (kg/m)	2.8	4.5	6.8	6.2
FCR	1.9	1.5	1.9	2.6

* stocked as juveniles

dous output of large high quality fresh shrimp from these systems provides a unique marketing opportunity for U.S. shrimp producers. Never before have large quantities of fresh, never frozen, head-on or processed product been available at virtually any count size on a year round basis in proximity to major markets in the continental U.S. Future large scale implementation of these technologies for more direct marketing to consumers may continue to fuel the ever increasing U.S. appetite for marine shrimp.



Industry Profile: Oscar L. Hennig



Education: M.Sc. in Aquaculture, UFSC, Brazil, 1995. Thesis: The effect of temperature background and the stocking density in intensive nursery system of *Penaeus paulensis*

B.Sc. in Oceanography, UERJ, Brazil, 1992.
Positions and Experience:

Research Associate, Shrimp Program, Oceanic Institute. Responsible for managing the Oceanic Institute Kona site, including production of specific pathogen free *Litopenaeus vannamei* and *Fenneropenaeus chinensis* post larvae, juveniles and Broodstock. 1999 to present. **Researcher**, Ceará Federal University Marine Research Institute - Fortaleza - Brazil. Research and extension service on marine shrimp - *L. vannamei*, disease management and disease diagnostics. 1998 to 1999 larviculture. 1993 to 1995.

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Two-phase hatchery system for the production of postlarval Pacific white shrimp, *Litopenaeus vannamei*

By Oscar L. Hennig, Karl Keller*, Leitutolu Rasmussen, Jerry Paige, and Fernanda R.O. Calderon.

Researchers at the Oceanic Institute in Kona, Hawaii, have been using a two-phase system for the production of *L. vannamei* postlarvae (PL) over the past two years. The system consists of an indoor phase (nauplii to PL-3) and an outdoor phase (PL-3 to PL-23). Mean hatchery survival for the past nine production runs have been > 60% from nauplii to PL-23.

Typically, larval rearing tanks are stocked with specific pathogen free nauplii at a density of 400/L. During the following two days, water volume is increased to 1,200 L and density is reduced to 170 larvae per liter. At PL-3, shrimp are harvested and transferred to 3,000-L tanks located in an outdoor greenhouse, and the stocking density is reduced to 35 PL per liter.



The outdoor greenhouse for the second hatchery phase

During the first hatchery phase, shrimp are fed three species of microalgae (*Chaetoceros sp.*, *Thalassiosira weissflogii* and *Tetraselmis sp.*). Artemia nauplii are introduced at the beginning of the mysis stage and are provided daily until PL-7. The amount of artemia nauplii provided daily is decreased from PL-4 to PL-7. Artificial dry feed is introduced at PL-2 and offered three times daily at 0900, 1200, and 1700. One week prior to transferring PLs from the first to the second phase, AquaMats™ are seeded with *Amphora sp.* in a separate tank.

One day prior to transferring PL-3 stage shrimp, outdoor tanks are prepared. Tank preparation includes filling tanks with seawater, seeding tanks with *Tetra-selmis sp.* and *Amphora sp.*, and installing conditioned AquaMats™ (1.3m² of AquaMat™ per m³ tank water). Around PL-23, shrimp are harvest and shipped to members of the U.S. Marine Shrimp Farming Program for research. Survival has been > 90% after 30+ hours of transport.

Benefits of this two-phase system are:

- 1) Less labor involved in caring for the tanks,
- 2) More efficient use of tank space,
- 3) A capacity to double PL production, and
- 4) A "ready to stock" PL that has been acclimated to pond conditions.



Trial #	Overall survival
1	Nauplii to PL-25 = 62%
2	Nauplii to PL-22 = 72%
3	Nauplii to PL-30 = 65%
4	Nauplii to PL-30 = 60%
5	Nauplii to PL-23 = 68%
6	Nauplii to PL-18 = 61%
7	Nauplii to PL-22 = 64%
8	Nauplii to PL-20 = 55%
9	Nauplii to PL-18 = 66%

Don't Miss the April 2005 Issue!

The next issue of Industry Briefs will deal with some tough and sensitive issues.

- 1) Shrimp tariffs...now that the battle is over, listen to what industry experts say will be the impacts and future of the industry
- 2) Feedback...hear what shrimp farmers say are the needs of our domestic industry and how the U.S. can compete against foreign imports

The USMSFP is actively promoting the U.S. marine shrimp farming industry. Go online for a copy of our brochure to find out more about the research institutions involved in this effort.



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