

# The Come Back of *Macrobrachium* Culture in the USA



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<http://www.msstate.edu/dept/cree/nre.html>

32nd Texas Aquaculture Association Annual Conference and Trade Show

## OVERVIEW

- Major production areas and countries, and long-term trends
- US consumption and domestic prices
- US production, investment and operating costs, and acreage
- Recent technological advances in the US
- Major constraints facing the industry

## WORLD PRODUCTION OF *Macrobrachium* SPECIES

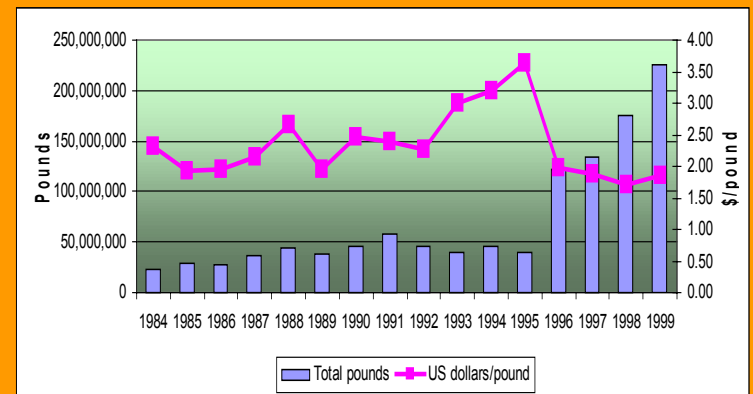
- Food and Agriculture Organization of the United Nations (FAO)

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## World Giant River Prawn (GRP) Production (FAO)

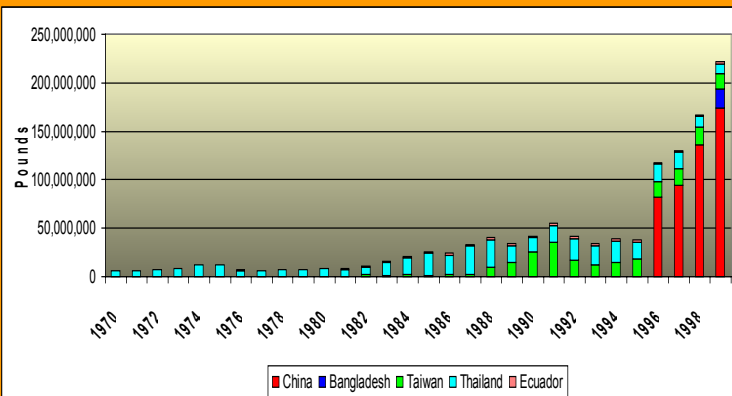


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## Top 5 GRP Producing Countries (FAO)

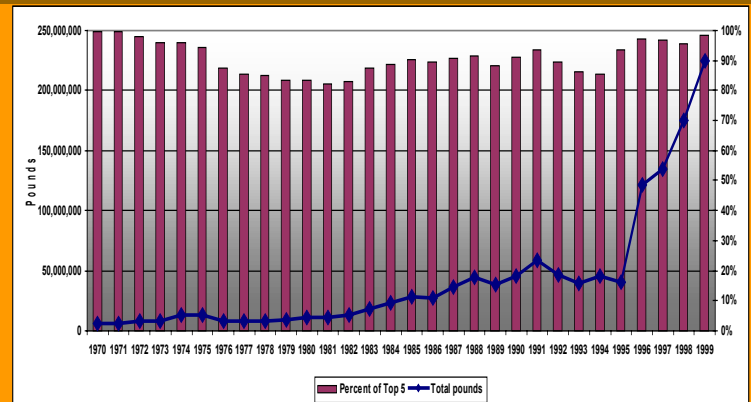


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## Percent Share of Top 5 GRP Producing Countries (FAO)

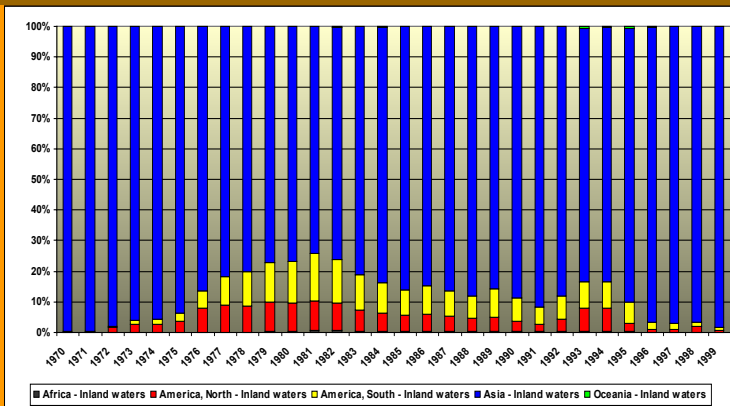


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## Percent Distribution of World GRP Production by Areas (FAO)



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## U.S. FWP PRODUCTION

- Food and Agriculture Organization of the United Nations (FAO)
- National Marine Fisheries Service (NMFS)
- U.S. Department of Agriculture (USDA)
- U.S. Joint Sub-Committee on Aquaculture (JSA)
- U.S. Prawn and Shrimp Growers Association (PSGA)

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## Freshwater Prawn Species

- **Market name**
  - Shrimp, Freshwater
- **Scientific name**
  - *Macrobrachium rosenbergii*
- **Common name**
  - Giant Freshwater Prawn

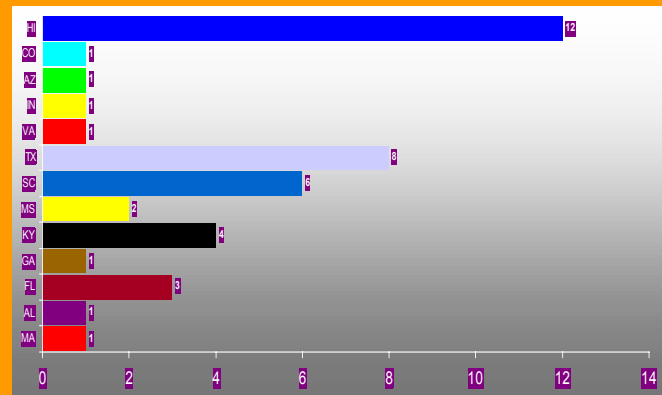


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## Number of U.S. Shrimp Farms, 1998 (USDA)

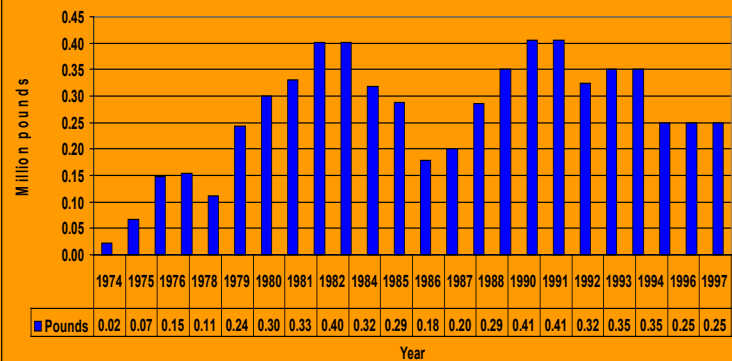


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## U.S. FWP Production (FAO, NMFS, JSA)

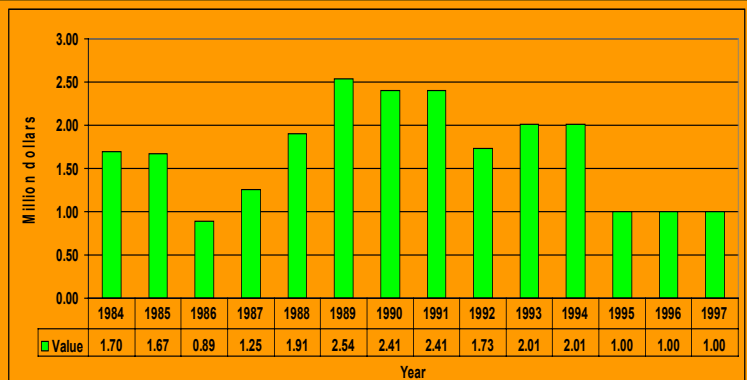


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## Value of U.S. FWP Production (FAO, NMFS, JSA)

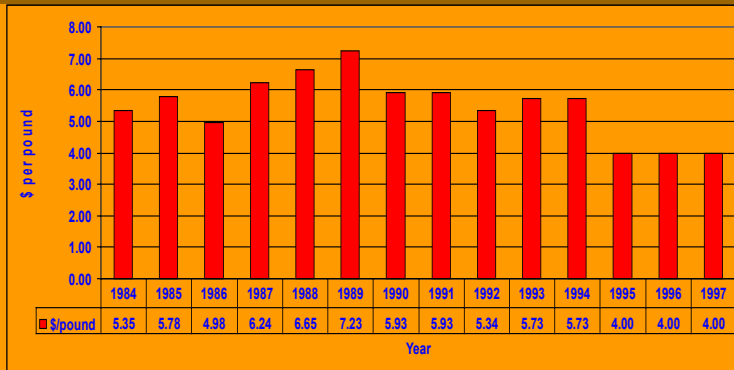


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## Imputed FWP Final Prices Paid by U.S. Processors and Dealers

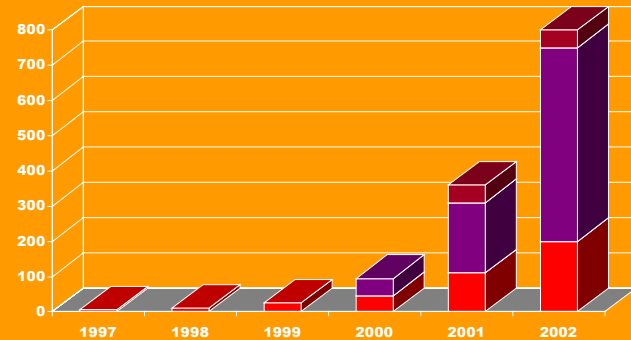


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## Estimated U.S. FWP Acreage



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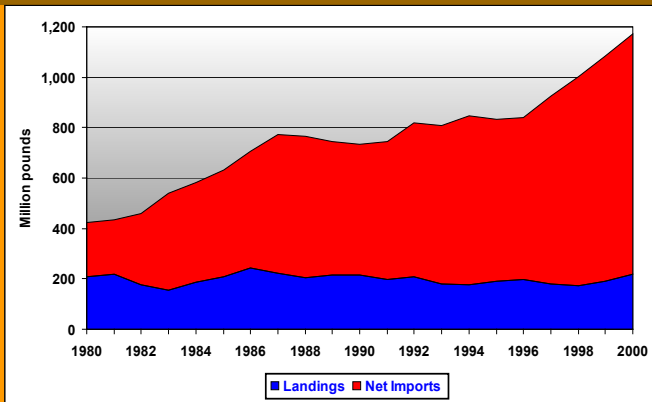
## **U.S. SHRIMP AND PRAWN GROWERS ASSOCIATION**

- **January 22, 2002 Organizational Meeting**
- **Website will be created**
- **Membership:**
  - **Voting members - permitted growers**
  - **Associate members**
- **P.O. Box 537, Anguilla, MS 38721**
- **Tel: 662-686-2894**

## **U.S. SHRIMP CONSUMPTION AND DOMESTIC PRICES**

- **National Marine Fisheries Service (NMFS)**

## U.S. Shrimp Consumption (NMFS)

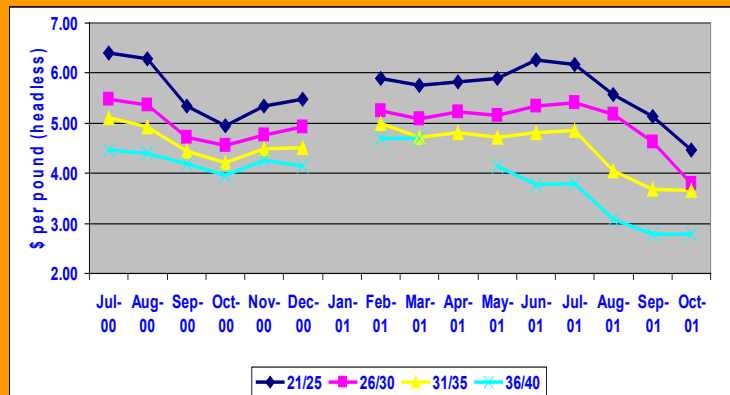


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## Northern Gulf of Mexico Shrimp Ex-vessel Prices (NMFS)

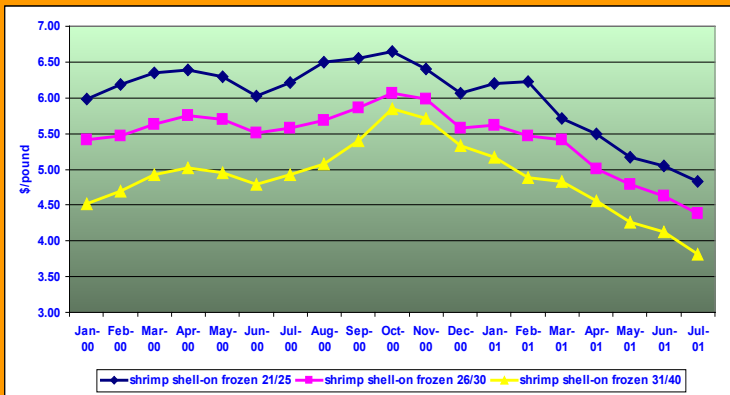


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## Imputed U.S. Shrimp Import Prices



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## INVESTMENT AND OPERATING COSTS IN FWP POND PRODUCTION IN THE USA

- Hypothetical single enterprise farm
- Semi-intensive production system
- One crop per year, early May to late September
- 120 culture days
- 121 land acres available
- Juveniles and commercial feed are available
- Input prices are based on Mississippi situation
- Feed conversion ratio is 2.5:1
- Stocking density is 20,000 # per water acre
- Harvest size is 10 # per pound
- Prawn yield is 1,200 pounds per water acre
- Exp-Com yield gap is 8 percent

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## **FWP Pond Production Initial Investment Requirements**



- 50 two-water-acre ponds, adequately sloped
- common or single harvesting sumps
- permanent aeration & electrical
- feeding equipment & storage
- well, pump and plumbing
- weed control equipment
- tractor, truck & storage building

**\$329.5K per farm,  
\$6.6K per pond or  
\$3.2K per water acre**

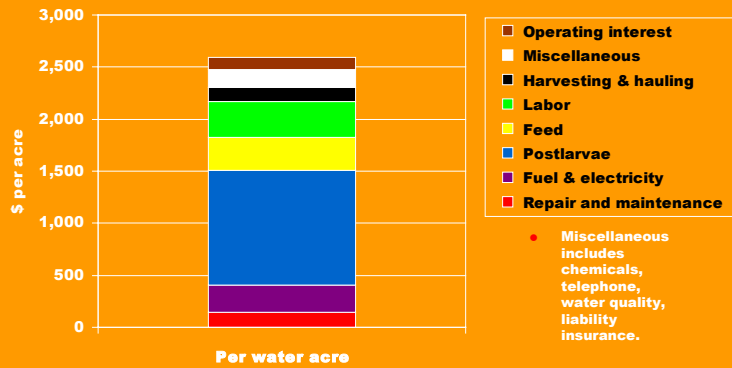
## **FWP Pond Construction Cost**



- Earth moving (adjacent ponds)
- Drainage structure
- Gravel
- Vegetative cover

**\$114.2 K per farm,  
\$2,283 per pond or  
\$1,142 per water acre**

## FWP Pond Production Variable or Operating Costs

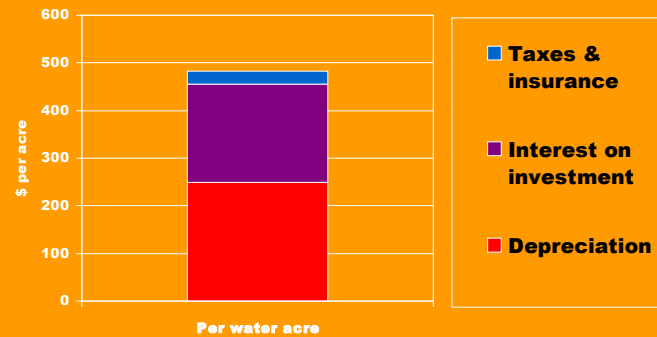


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## FWP Pond Production Fixed or Ownership Costs



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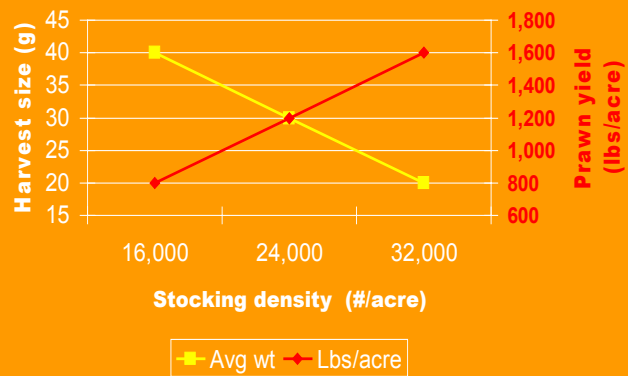
## RECENT ADVANCES IN FWP POND GROW-OUT IN THE USA

- Use of substrates
- Higher stocking densities
- Phased feeding
- Use of graded juveniles
- Pond design and construction
- Pond preparation and management
- Harvesting and processing
- Marketing

## FWP Research and Extension

- Aquaculture Research Center, Kentucky State University (KSU-ARC) <http://www.ksuaquaculture.org/>
- National Warmwater Aquaculture Center, Mississippi State University (MSU-NWAC) <http://www.msstate.edu/dept/tcnwac/>
- Coastal Research and Extension Center, Mississippi State University (MSU-CREC) <http://www.msstate.edu/dept/crec/crec.html>
- University of Tennessee Extension Service (UTES) <http://www.utextension.utk.edu/aquafish/>

## Effects of Higher Stocking Densities on Harvest Size and Yield at KSU-ARC

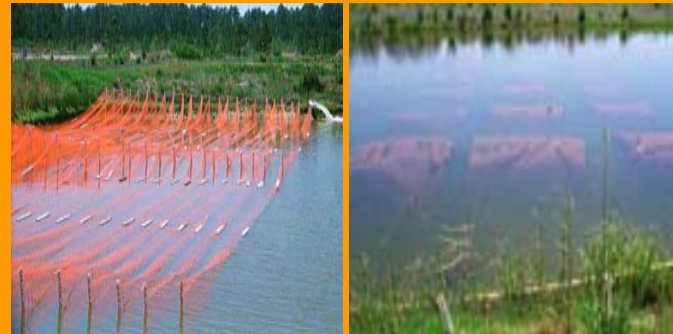


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## Artificial Substrate Experiments at MSU and KSU

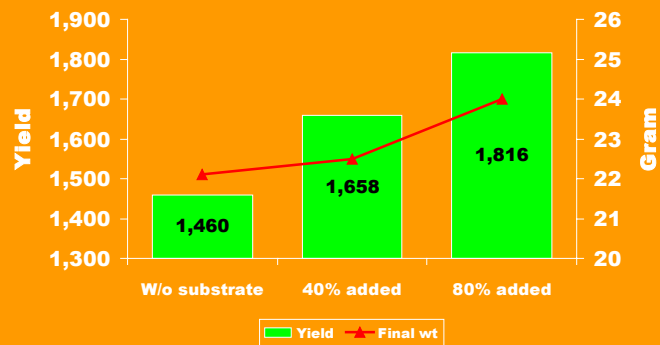


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## Effects of Added Substrate on Yield and Harvest Size at KSU-ARC (1998)

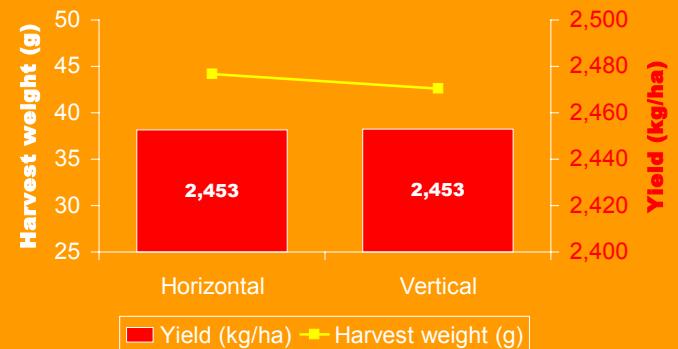


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## Effects of Substrate Orientation on Yield and Harvest Size at KSU-ARC (1999)

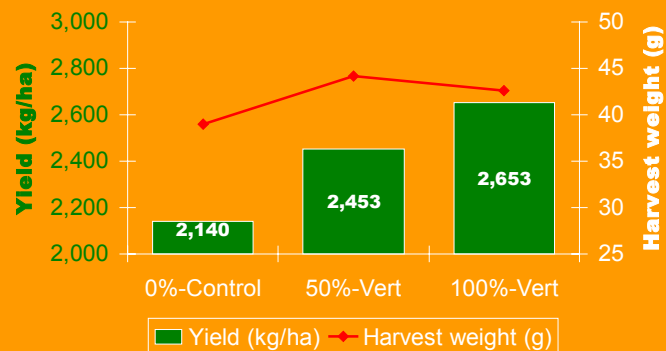


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## Effects of Added Substrate on Yield and Harvest Size at KSU-ARC (1999)



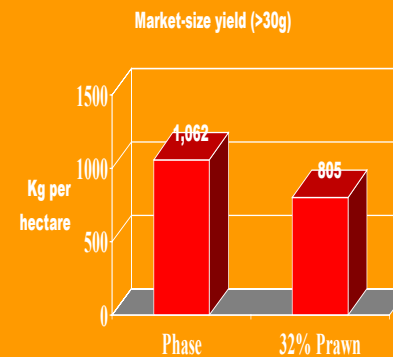
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## Phase Feeding Experiments at KSU-ARC (2001)

- Phase feeding (Control) - Distillers grain for the first four weeks, a 32% protein prawn diet for weeks 5-12, and the 40% protein penaeid diet for weeks 13-18.
- The 32% protein prawn diet throughout the production season



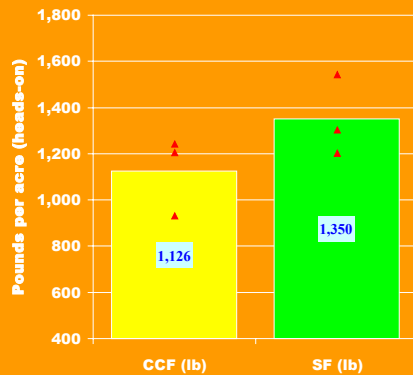
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## Feed Experiments at MSU-CAU (2001)

- **Channel Catfish Feed**
  - pelletized
  - sinking
  - 32% protein
- **Shrimp Feed**
  - pelletized
  - sinking
  - 35% protein

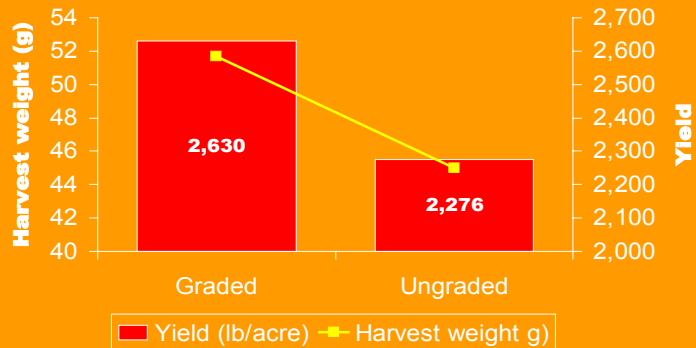


## Graded Juveniles Experiments at MSU and KSU



- **Price ranges:**
  - Post larva (0.01 g)
    - \$25-\$40 per 1,000
  - 30-day juveniles (0.08 g)
    - \$45-65 per 1,000
  - 60-day juveniles (0.25 g)
    - \$60-\$75 per 1,000
- **Air freight for PL's only:**
  - At cost + \$5 per 1,000
- **Grading and delivery costs of juveniles**

## Use of Graded Juveniles in Experiments at KSU-ARC (2000)



## Design and Construction of FWP Ponds (MS & KY)

- **Experimental ponds at MSU & KSU**
  - 0.10, 0.25 water acre
- **Commercial ponds**
  - 1 water acre ponds in KY
  - 2, 3 water acres ponds in MS
  - 5, 9 water acres catfish ponds in MS
- **Adequately sloped, 4-inch per 100 ft**
- **14-16 inch drain pipe & slightly deepened area**
- **Catch basins or harvest sumps**

## **Experimental FWP Pond Preparation at MSU-CAU (2001)**

- **Drained ponds in Oct. 2000**
- **Checked soil pH and applied lime in Feb. 2001 at 2,400 kg/ha**
- **Flooded ponds and applied rotenone in May 2001 at 900 ml/pond**
- **Installed 1 HP electric aerator in each pond**
- **Stocked ponds in June 2001**

## **Experimental FWP Pond Management at MSU-CAU (2001)**

- **Pond aeration running all the time**
- **Pond DO's and water temperature were checked daily**
- **Emergency aeration was added to ponds with critical DO level**
- **Nitrite, salinity and pH were checked bi-weekly**

## FWP Harvesting and Processing at MSU-CAU (2001)



- Drained ponds, screened drain pipes and pumps
- Picked up prawns, harvest sumps
- Prawns were washed, weighed in baskets
- Prawns loaded into totes with crushed ice
- Prawns delivered to processing plant

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## FWP Marketing

- **Selling Live FWP**
  - Cost of production
  - Cost of harvesting
  - Cost of live-hauling or shipping
  - Hauling or shipping risks
  - Marketing permit
  - Limited market information
- **Selling Fresh or Frozen FWP**
  - Cost of production
  - Cost of harvesting
  - Costs of chilling or processing, packing and shipping
  - Price risks
  - Limited market information
- **Niche vs. wholesale commodity markets**

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## **CONSTRAINTS FACING THE PWP INDUSTRY IN THE USA**

- **Lack of local nurseries**
  - Less than half a dozen nurseries nationwide
  - High price for nursed juveniles
  - Stress during transport to distant sites
  - Need for on-site nursery facilities
- **Low survival in grow-out**
  - Exp-com grow-out yield gap
  - Relatively low production
- **Insufficient processing, transporting & marketing infrastructure**
  - Except in traditional shrimping areas
  - High transport mortality of live FWP