TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Technical Assistance for Shrimp Fishermen

Developed by

M.G. Haby, R.J. Miget, & G.L. Graham

Texas Cooperative Extension
Sea Grant College Program
Texas A&M University

January, 2004

Texas Cooperative EXTENSION
The Texas A&M University System

Sea Grant

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Topics Covered in this Technical Assistance Program

- Roots of the economic crisis
- Response to the economic crisis by:
  - Industry
  - Government
  - Universities
- What can you do now?

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Roots of The Economic Crisis … A *"Perfect, Economic Storm"*

- **Growing supplies of farm-raised shrimp + a global, economic slowdown starting in 2000 = lower worldwide shrimp prices.**

- **U.S. shrimp prices were pushed even lower by:**
  - **enforcement of food safety standards in the E.U.**
  - **a strong U.S. Dollar (until recently)**
  - **higher tariffs for some Asian shrimp in the E.U.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Industry Response to the Economic Crisis

- **Southern Shrimp Alliance (SSA) created.**
- **SSA initiates anti-dumping litigation against some shrimp-exporting countries.**
- **Shrimp industry trade associations work to create generic marketing programs.**
- **SSA asks Sea Grant to create a quality certification program that would *"guarantee"* premium-quality, shrimp.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Government Response to the Economic Crisis

- Congress authorizes $35 million for shrimp fishermen.
- GSAFF funds research that re-confirms how flavor differences occur in wild shrimp.
- FDA adopts worldwide standard for antibiotic residues.
- State shrimp marketing programs created.
- USDA declares commercial fishermen eligible for Trade Adjustment Assistance if injured by imports.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

University Response to the Economic Crisis

- TAMU faculty documents the magnitude and scope of the unprecedented, economic crisis (2002).
- Sea Grant faculty begin designing a verifiable quality management program for cooperating producers and processors known as *"The Mark of Quality"* (2003).
- TAMU faculty prepare the report that establishes eligibility for Trade Adjustment Assistance (2003).
- TAMU conducts Technical Assistance (2004).

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

What has been learned over the last three years?

- **Industry trade associations have put the economic crisis of producers and processors on the *"radar screens"* of federal, state, and local elected officials.**
- **This economic crisis has been driven by an imbalance between worldwide supply and demand; not resource management concerns that exist in other fisheries.**
- **Fundamental changes are afoot in the American marketplace … the old ways will not be sufficient.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

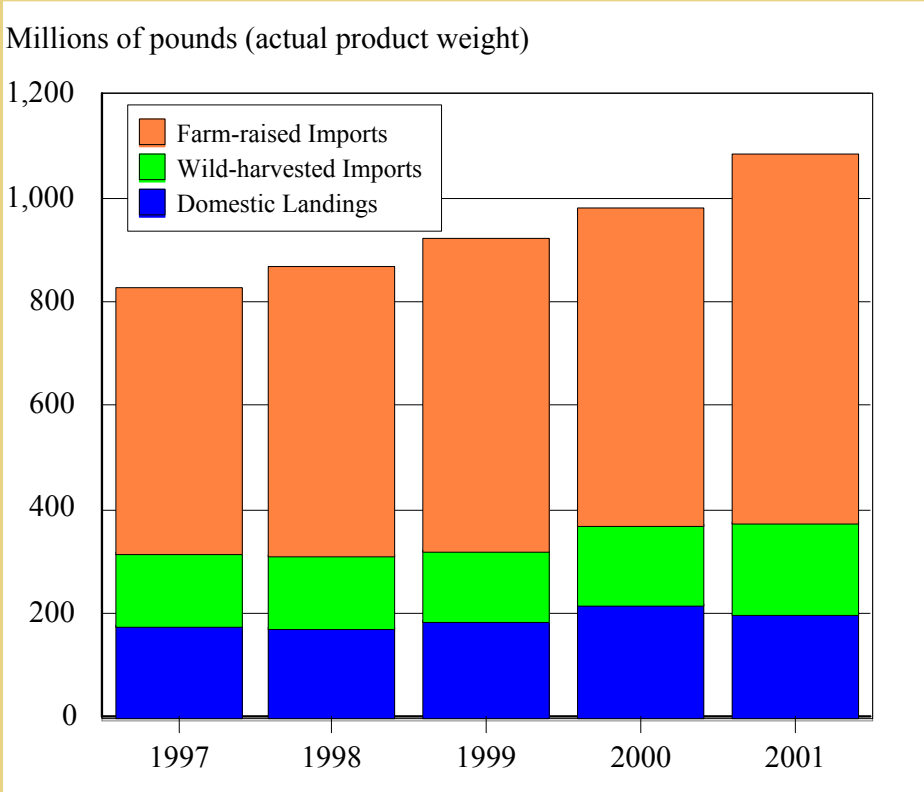
Meet the New Competitor … Internationally Farmed Shrimp

- 36 percent of world supplies.
- Further growth expected since:
  - wild resources fully utilized
  - better culture technology.
- Provides local employment.
- Export revenues fund national infrastructure improvements.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

The American Shrimp Market

- **Demand has exceeded landings for over 40 years.**
- **Imports fuel growth in domestic shrimp market.**
- **Cultured imports comprise 65 percent of total beginning supplies.**



TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Cultured Imports Have Created A Higher Quality Expectation!

- With 65 percent of beginning supplies, the quality standards of farmed production have become the new standard by which all other shrimp are judged.

- This upgraded quality standard is a fundamental change to which we must adapt.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Conformance to Specifications Determines Shrimp Value

- **Product condition:**
  - odor
  - texture
  - dehydration
  - no black-spot
  - no chemical abuse
- **Pack style:**
  - weights, counts & uniformity
  - no damaged tails or pieces
  - no soft-shells

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

It's true … there is a price for every shrimp … but

- **shrimp not meeting the new, upgraded quality standards will be relegated to a lower tier within the market and will be priced accordingly.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

What Can You do Now?

- **The fastest way to improve everyone's "bottom line" is to improve the quality of the shrimp you land.**

- **TAMU researchers found that by reducing physical damage defects, vessel revenues increased by about $22,000 a year (with about 55,000 lb. of production).**

- **TAMU researchers also found that improved quality significantly reduced the production expense ratio – the cost to land a dollar's worth of shrimp – from 98¢ to 93¢.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

What Conditions Impact the Quality of Wild Shrimp?

- Tow times
- Back-deck activities once shrimp are landed
  - culling
  - heading
  - washing / dipping
  - stowing below deck
- With freezer boats:
  - bagging or boxing
  - on-deck brine freezing
  - stowing IQF shrimp below deck

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

How Do Tow Times Impact the Quality of Wild Shrimp?

- **Unavoidably, wild shrimp usually die in the net.**
- **Upon death, bacteria and enzymes attack the "freshness" of shrimp at a rate dependent upon water temperature.**



TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

On the Other Hand …

- **Farm-raised shrimp typically die in a slush-ice bath as their body temperature drops to 32° F.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Shrimp Quality Improves With Shorter Tow Times

- Physical damage is reduced. Pieces are a major drag on revenue. In summer 2003, a piece was worth about 38 percent of what a whole tail would have fetched.

- When shrimp spend less time in the net,
  - growth of spoilage bacteria is minimized and
  - accumulation of enzymes that discolor shrimp is reduced.

- Shorter tows create “spill over” benefits for back deck operations.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Recommended Number of Drags & Maximum Duration

Months	Number of Drags & Duration
January – April	3 drags per night
May – June	No drag longer than 3 hours
July – September	Only 2-hour drags
October – December	No drag longer than 3 hours

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

In Summer, "Smart" Back-deck Procedures are Essential (1)

- 44 percent of annual Texas shrimp production occurs between mid-July and August 31.
- The objective needs to be complete processing of the catch in segments rather than completing each step – culling, heading, washing, and freezing – as "one big job" before moving to the next task.
- Brine systems can destroy quality during heavy production periods if their freezing capacity is exceeded.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

In Summer, "Smart" Back-deck Procedures are Essential (2)

- **The preferred approach should be to make a basket of *"just-headed"* shrimp the control that triggers the next step like washing, dipping, or freezing.**



TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Management of Brine Freezing Operations for Premium Quality

- Myths about brine tanks.
- Properly charging the brine tank before each cruise.
- Knowing when and how to recharge the brine tank with salt and dip.
- Managing the quantity of shrimp placed in the tank.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Myths Surrounding Brine Freezing Operations (1)

- ***"The longer my shrimp stay in the brine tank, the more weight they will gain."***

  - **brine is 25 times saltier than a shrimp's body fluids**
  - **water will migrate out of the shrimp into the brine and**
  - **salt will migrate out of the brine into the shrimp until the outside of the shrimp is solidly frozen.**

- **THE FASTER SHRIMP CAN FREEZE THE BETTER!**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

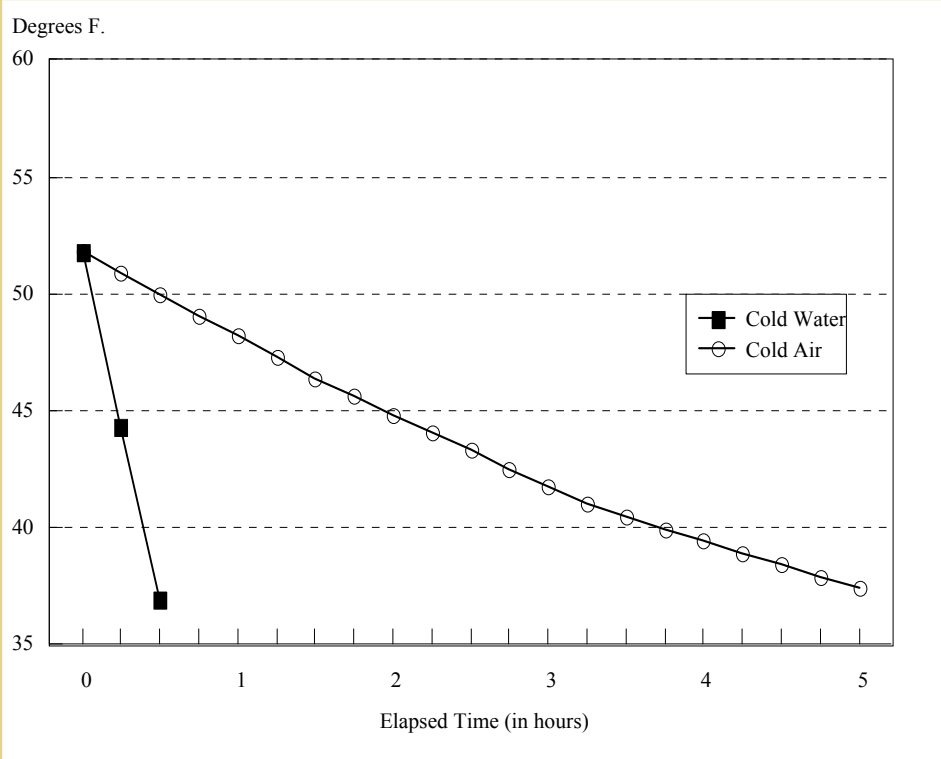
Myths Surrounding Brine Freezing Operations (2)

- ***"Brine units were never designed to freeze shrimp, only chill them so they will freeze faster in the hold."***
  - **Historically this was true, but today properly charged and managed brine units should freeze shrimp in about 20 minutes.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Myths Surrounding Brine Freezing Operations (3)

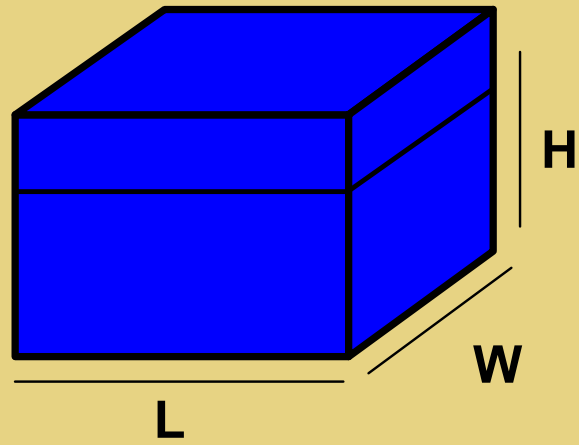
- ***"Putting my shrimp directly in the freezer hold is all that's necessary to ensure good quality shrimp."***
  - **spoilage occurs until the product freezes.**
  - **slow freezing creates large ice crystals that break cells open.**
  - **when thawed, much of the cell fluids leak out.**



TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Charging the Brine Tank Before Each Cruise (1)

- Determine how many gallons your brine tank holds
  - Mark the “full line” (height) & measure it in inches
  - Measure the inside width and length of the tank in inches
  - Gallons = (height x length x width) / 231.
  - So… (36” x 84” x 36”) / 231 = 471 gallons.
  - Fill with fresh (city) water to the “fill line.”



TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Charging the Brine Tank Before Each Cruise (2)

- Add ingredients to the brine tank (salt, dip powder, and corn syrup or corn syrup solids). The table shows required proportions.

Ingredient	Proportion	Quantity for 471 gallons
Salt	2.53 lb. / gal.	(2.53 x 471 gal.) = 1,192 lb.
Dip powder	0.074 lb. / gal.	(0.074 x 471 gal.) = 34.8 lb.
Corn syrup	0.12 gal. / gal.	(0.12 x 471 gal.) = 56.5 gal.
or		
Corn syrup solids	1.19 lb. / gal.	(1.19 x 471 gal.) = 560 lb.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Charging the Brine Tank Before Each Cruise (3)

- Thoroughly mix these ingredients before cooling.
- Use a submersible pump or drum mixer to move the ingredients into solution.
- Once ingredients are dissolved, start the compressor. If the brine is mixed correctly the temperature of the brine should approach the coldest temperature possible -6° F.
- A working temperature between 5° F and 0° F will freeze shrimp within 20 minutes.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Recharging the Brine Tank During the Cruise (1)

- During brine freezing operations the salt concentration is gradually reduced. As brine becomes less concentrated the minimum achievable temperature increases. This means a longer soak time to freeze shrimp.

- The concentration of dip powder also drops with repetitive use. The practical effect of a low dip concentration is black spot formation as the product thaws.

- Corn syrup or corn syrup solids do not need recharging.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Recharging the Brine Tank During the Cruise (2)

- The initial charge is based on the gallon volume of your tank, but recharging is dependent upon the pounds frozen.

- After every 1,000 pounds frozen in the brine tank, add
  - 28 pounds of salt (6.5” deep in a 5-gallon plastic pail)
  - 1 cup of dip powder.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Recharging the Brine Tank During the Cruise (3)

- Alternatively, recharging is signaled by a drop in the refractometer reading of 2 units.

- To restore those two units to the salt concentration
  - multiply tank capacity by 8.3 lb per gallon of brine by the 2 percentage units need to restore the brine to its original concentration.
  - So … (471 gal. x 8.3 lb. / gal. x 0.02) = 78 lb. salt
  - add three cups of dip powder.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Recharging the Brine Tank During the Cruise (4)

- Regardless of the recharge method selected – pounds frozen or a 2 unit drop in the refractometer reading – someone needs to monitor one of those conditions.

- Remember, the practical effect of ignoring the brine or dip powder concentration during a cruise could mean having the product down-graded at the dock.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Ensuring Peak Performance from the Brine Tank (1)

- Putting too much shrimp in the tank never allows the brine to get below 20° F. This creates quality problems.

- During heavy production periods:
  - once a basket of shrimp is headed, begin the next processing step with that container.
  - never load the unit with more than 15 pounds of shrimp per 100 gallons of brine. For the 471 gallon unit, a maximum of 70 lb. should be frozen at one time.
  - use a thermometer to ensure brine stays between 5° F and 0° F.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Ensuring Peak Performance from the Brine Tank (2)

- During the first cruise off Texas in mid-July:
  - Consider carrying ice in insulated totes that can be secured on deck.
  - Use the ice to chill fresh water in a separate container.
  - If production exceeds the crew's ability to head and freeze, keep unprocessed shrimp in chilled water until they can be handled.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Quality Management Aboard Ice Boats (1)

- Just as on freezer boats, the preferred approach should be to make a basket of *"just-headed"* shrimp the control that triggers the next step like washing, dipping, and stowage below deck.

- If you use dip powder in a pre-chill ice bath use 1 cup powder for every 10 gallons of water.

- If you use dip powder to treat shrimp with deck temperature water use 1.5 cups powder for every 10 gallons of water.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Quality Management Aboard Ice Boats (2)

- **Washing removes some spoilage bacteria – it is an important step.**

- **If Everfresh® is used to prevent black spot, mix one 200 gram pouch in 25 gallons of clean seawater. Agitate shrimp for 2 minutes, then drain and ice.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Summary and Conclusions (1)

- **Industry leaders suggest that wild shrimp be positioned as a premium, high-priced specialty product with attributes that cannot be duplicated in ponds.**

- **Wild shrimp have a flavor that distinguishes them from the vast majority of shrimp available in the U.S., but flavor alone will not establish domestic shrimp as a top-tier specialty product unless it compares favorably with shrimp from high-grade shrimp processors.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Summary and Conclusions (2)

- **Virtually all shrimp fishermen can deliver such a premium-quality product!**

- **Following the procedures outlined in this presentation will enable all operators to maximize their fraction of premium-quality shrimp.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Summary and Conclusions (3)

- **Remember:**
  - **Shorter tow times reduce damage, spoilage, and discoloration.**
  - **The objective of back-deck processing should be complete processing of the catch in segments rather than completing each step as "one big job" before moving to the next task. Use a *"just-headed"* basket of shrimp as the control that triggers next steps.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Summary and Conclusions (4)

- **Remember:**
  - **Brine systems should freeze shrimp in about 20 minutes.**
  - **Quick freezing occurs when the capacity of the system is not overloaded. Use the "15 lb. of shrimp to 100 gallons of brine rule."**
  - **Brine temperature is key information. Buy a $20.00 thermometer and use it!!**
  - **Monitor the amount of shrimp you run through the tank and recharge with salt and dip powder after every 1,000 lb.**

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

Final Thoughts

- The current economic crisis is the result of a worldwide demand/supply imbalance.
- Buyers have higher expectations of quality. We must adapt to this fundamental change.
- Other industries have found that higher quality doesn't cost; it pays!!
- Producing high quality shrimp requires that we work smarter; not harder.

TAA
Trade Adjustment Assistance for Farmers
Technical Assistance

“It’s Your Future … Be There”