Mechanical Harvesting Aids for In-Door, Closed System Tilapia Production

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BACKGROUND

TILAPIA AQUACULTURE
- Tilapia are fast growing white meat fish that are well suited for aquaculture production.
- These fish are grown in high density indoor closed water systems.
- Mature tilapia average 1.5 lbs at harvest.
- Once mature, they are typically harvested and hauled live in oxygenated truck tanks.

MARKETING
- One 3.5-ounce serving has 18 grams of protein, 85 calories and only 1 gram of fat.
- A Mid-Atlantic Cooperative has developed the Farmer’s Catch Brand for locally grown tilapia.

PRODUCTION OVERVIEW AT BLAIR VIEW AQUACULTURE FARM
- Blair View Farm, Inc. is a state-of-the-art aquaculture facility with 24 indoor ponds.
- 10,000 lbs of tilapia are produced weekly.
- Computerized, fully-automated systems are used for water circulation and feeding.
- Mature fish are caught and loaded manually using perforated baskets.

CURRENT PROBLEMS
- The manual harvesting operation is labor intensive and requires workers to enter the tanks, significantly increasing the chance for injury.
- Worker fatigue and ergonomic-related ailments continue to exist with the harvest crew.
- Mr. Blessing recently underwent a knee replacement, and can no longer work in the tanks during harvest.

DELAWARE-MARYLAND AGRIBILITY:
TILAPIA AQUACULTURE
VIEW AQUACULTURE FARM

OVERAL PROJECT GOAL
Design and implement cost effective mechanical harvest aids for the Blair View Farm Aquaculture Facility that reduce the potential for worker injury while maintaining harvested fish quality suitable for live markets.

KEY AREAS OF IMPROVEMENT
- Improve the ergonomics of harvesting by eliminate high force, high stress maneuvers performed by workers.
- Reduce the number of workers required for the harvest crew.
- Maintain quality for live markets by minimizing time-out-of-water and bruising of the harvested fish.
- Weigh each full basket prior to unloading into the transport truck.

KEY FINDINGS
- Harvest crew size reduced by two workers.
- Worker fatigue significantly reduced.
- In general, less injury-prone maneuvers performed by the workers catching tilapia and loading basket onto the conveyor.
- Total harvest time for 4000 lb and 6000 lb loads did not significantly decrease.
- No evidence of stray voltage from the conveyor while in the pond.
- Total system cost ~ $3,500.
- Mr. Blessing is now able to fully participate in the harvesting operation.

CONCLUSIONS
Cost effective mechanical harvesting aids have been developed for the Blair View Farm Aquaculture Facility. Using a flighted conveyor, several high-stress, injury inducing maneuvers have been eliminated from the previous catch and lift harvesting method. The system accommodates the weighing of filled baskets, and does not induce damage to the harvested tilapia sold as live market fish.

ON-GOING WORK
Under development is an alternative to the basket catching technique still being used. A large “cage” style catching device suspended from an overhead boom has been designed and will be tested later this year. If successful, this approach will further improve the work environment and reduce the potential for injury.

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