

**IMPLEMENTATION OF PLANS OF WORK (POW)
UNDER THE AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION
REFORM ACT OF 1998 (AREERA)**

2005 ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

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IMPLEMENTATION OF 5-YEAR PLANS OF WORK (POW) 2005-2006 UNDER THE AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION REFORM ACT OF 1998 (AREERA)

2005 ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

INTRODUCTION

The 1890 Research and Extension programs are administered by the School of Agriculture, Fisheries and Human Science at the University of Arkansas at Pine Bluff. The School consists of three academic departments, Agriculture, Fisheries and Human Science. Federal, state and private funds supported sixty (60) ongoing projects with most of the research projects conducted at the UAPB campus site, with some activities occurring at the UAPB Lonoke and Marianna farm sites. Additional studies were conducted on cooperating farm sites, the Felsenthal National Wildlife Refuge, Lake Chicot, and abroad in nine (9) countries: Kenya, Tanzania, Ghana, South Africa, Guyana, Puerto Rico, Mexico, Honduras and Peru. Faculty submitted fifty (50) proposals for external funding to support research and extension activities. These proposals added \$2.4 million in additional funds to support research and extension initiatives related to problems of importance to the citizens of Arkansas, the nation and the world; and extended the knowledge gained by these research activities to families and communities through a variety of outreach and extension programs. The extension program has structured programs in 20 counties with staff housed in 7 counties.

Research and Extension in Agriculture are conducted in the areas of plant science, animal science and agricultural economics. The efforts in the Department of Human Science are directed toward human nutrition, food safety and family life.

The Agriculture and Human Science components of the research and extension programs are designed to provide information and assistance to small-scale and limited-resource farmers and disadvantaged families and youth. The Aquaculture/Fisheries program supports both the state's aquaculture industry and recreational fishing.

The size of the faculty for the School of Agriculture, Fisheries and Human Sciences is relatively small and the death of two of its faculty during the past year impacted programs significantly. One additional faculty member resigned thus requiring us to shift some programs and re-direct faculty assignments.

The research program 9 under Goal 5, Socio-economic impact of agricultural policy on minority and limited resource farmers was been reassigned to a new faculty upon the resignation of the intended Principle Investigator. The program is reported with its initial results. The extension program 6 under Goal 5 has been moved to an Integrated 1890 Research and Extension program due to the collaborative efforts with the project. The matrix has been adjusted to note the transfer to the integrated program.

Stakeholder input process

The 1890 Research and Extension programs at the University of Arkansas at Pine Bluff continue to require extension and research personnel to develop their own stakeholder input mechanism. This input will differ depending on the structure of the program. Stakeholder input is obtained from one-on-one contact and evaluations conducted on site. Extension and research personnel seek additional stakeholder input at producer meetings, professional meetings, workshop and focus groups.

The Agriculture Research and Extension Advisory Council, a means of obtaining formal stakeholder input, was organized in 2004 and continues to be an effective means of gaining input. The Council met during 2005. Membership on the council will change with the need of research and extension programs as determined by 1890 administration and council recommendations.

The Small Farm Management Program offers an additional avenue for stakeholder input through producers involved in the program.

The UAPB Aquaculture/Fisheries Center prides itself on the level, scope, and effectiveness of its interactions with stakeholders. Input and interaction with stakeholders occurs on an almost daily basis with personnel in the Center. Individual farmers, representatives of trade associations, and board members interact frequently with Center researchers and extension specialists. The interaction often is initiated with a request for some specific type of information. The specific questions often expand into broader discussions as the state of knowledge in particular areas through which additional research needs become readily apparent.

Formal input is obtained from the National Fisheries Advisory Council. At the 2005 meeting of the National Fisheries Advisory Council, each designated group of stakeholders brought research and extension needs to the meeting.

Additional input is obtained from the annual conventions and meetings of the two major trade associations in the state: Catfish Farmers of Arkansas and the Arkansas Bait and Ornamental Fish Growers Association.

The active involvement of our extension group throughout the eastern and southwest portions of the state also provides constant opportunity for input into the research programs

For the natural fisheries research and extension areas, the primary stakeholder defined for the UAPB Aquaculture/Fisheries Center is the Arkansas Game and Fish Commission (AGFC). The increased interaction with the Arkansas Game and Fish Commission in recent years has facilitated greater communications and interaction. Formal input is obtained through the representation of the Arkansas Game and Fish Commission on UAPB's National Fisheries Advisory Council. Additional opportunities for interaction and input are available at the statewide meeting of the Arkansas Chapter of the American Fisheries Society. Many AGFC managers and biologists attend these meetings.

Also, the increasing involvement of Center scientists on committees of the Southern Division of the AFS and at the national level provide opportunities for additional input because a number of AGFC personnel continue to be active in those settings. In 2005, the AFC Center Director was

asked to chair a task force for AGFC. While the task force focused on its specific charge, the frequent meetings throughout the year at the AGFC headquarters and the AGFC representatives on the task force resulted in much valuable exchange of information and input into directions for research and extension programs. Also, in 2005, the AFC Center organized two workshops for AGFC personnel, both hosted at UAPB. More than 45 individuals from AGFC attended each workshop.

Program review process

Our research and Extension programs are monitored annually through a performance appraisal system that assures adherence to goals planned. Each department in the School of Agriculture, Fisheries and Human Sciences has an internal peer review system that evaluates research proposals prior to their implementation.

Merit review is central to the institutional goal of implementing quality programs. A request for a CSREES review was made in 2004. That review did not materialize and a second request for a CSREES review was made in 2005. This review has been granted and is scheduled for April 30, through May 4, 2006. The review will include all Extension and research programs in the school.

The School of Agriculture, Fisheries and Human Sciences faculty is currently working on the self-study report to be sent prior to the review team's visit.

The Aquaculture/Fisheries Center conducted an external review in 1999 to comply with the Merit Review Process mandated in the five-year POW. In November 1999, Drs. Robert P. Romaine, Louisiana State University, Bill Simco, University of Memphis, Jimmy Avery, Mississippi State University, and Robert Durborow, Kentucky State University were invited to review the research and extension activities as a component to the Merit and Peer Review process of the Plan of Work submitted to the Cooperative State Research, Education, and Extension Service (CSREES). Drs. Romaine and Simco were responsible for reviewing the research and teaching programs and activities in the Aquaculture/Fisheries Center.

In 2003, to provide for more continuous merit review by university colleagues, Drs. Romaine and William Shelton were added to the National Fisheries Advisory Council. Along with Dr. Simco, a long-time member, there are now three university scientists who meet annually to review and recommend new directions for the UAPB Aquaculture/Fisheries Center.

Moreover, the Strategic Plan for the AFC Center is in the process of being updated for the next 5-year period, 2007-2011. The new draft of the 2007-2011 Strategic Plan will be reviewed by the UAPB National Fisheries Advisory Council that includes peer researchers and extension specialists.

**OVERVIEW OF RESEARCH AND EXTENSION PROGRAMS REPORTED IN THE
2005 – 2006 PLAN OF WORK BY GPRA GOALS**

Function	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
1890 Research Program	1.Crop protection systems (C) 2. Alternative crop production (C) 3.Minimally processed value-added products (N) 4.Efficiency and profitability of hog farms (N) 5.Engineering insect resistance in cowpea through gene transfer (N)		6. Vegetable and herb production (C) 7. Health benefits of probiotic bacteria (C)	8. Small ruminant nutrient/management (C)	9. Socioeconomic impact of agricultural policy on minority and limited-resource farmers (N) 10. Improving quality of life (C) 11. Predictors of quality child care programs (N)
1890 Extension Program	1.Adoption of new best management practices (N) 2. Beef herd improvement (M)	3.Nutrition education and wellness system (Food Safety) (C) 4.HACCP training and education (N)	5.Nutrition education and wellness system (Diet and Health) (C)		6.Family and youth programs (M) 7.Agriculture awareness (N) 8.Youth livestock program (N) 9.Small farm management (N)
Integrated 1890 Research and Extension Programs	1. Catfish production and management (C) 2. Baitfish production and management (C) 3. Sustainable vegetable production (C)			4. Water quality monitoring	5.Recreational fishing in the Delta (C)

(C) – Continuing from 2000 – 2004 POW

(N) – New to 2005 -2006 POW

(M) – Modified in the 2005 – 2006 (POW)

Programs moved in the matrix

Goal 5 – Integrated 1890 Research and Extension Program 4 was originally presented as a research program

ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS – POW October 1, 2004 – September 30, 2005

Executive Summary

Six Research, 2 Extension and 2 integrated programs were implemented under Goal 1. Four of these are new to the 2005-2006 POW.

Six programs under Goal 1 are administered in the Agriculture Department. All of these programs were designed to investigate alternative products or farming practices that could aid small and limited-resource farmers. However, the scope of these programs encumbers a wide array of the agriculture community. Research program 1 (Crop Protection System) investigated alternative methods for crop protection that can be utilized on a global basis.

Research programs 2, 3, 5 and 6 address various crops, production practices and marketing strategies that influence sustainability of vegetable farmers in Arkansas and surrounding states. Research program 4 (Efficiency and Profitability of Hog farms) is a multi-disciplinary program that is aimed at supporting the profitability of hog farmers. Information developed will be useful to all hog farmers in Arkansas and nationally.

Aquaculture in Arkansas can roughly be divided into two broad segments, the catfish industry, and the bait and ornamental fish industry. Each of these segments has its own trade association. The UAPB Aquaculture/Fisheries Center divides its aquaculture research and extension resources into programs designed to address and meet needs and issues of each of these two industry segments. Thus, there are two major priority program areas (Integrated 1890 Research and Extension Programs under Goal 1) within the Aquaculture/Fisheries Center: Catfish Production and Management and Baitfish Production and Management.

In 2005, the UAPB Aquaculture/Fisheries Center focused its research and extension efforts on various components of the two strategies described above to enhance competitiveness of Arkansas aquaculture. Within the Catfish Production and Management program area, the UAPB Aquaculture/Fisheries Center focused on: 1) market preferences for farm-raised catfish; 2) improved management options to improve efficiencies and lower costs; 3) fish disease biosecurity; 4) catfish research verification; 5) fish farm data collection and record keeping; and 6) impacts of Aquaculture/Fisheries Center programs. Within the Baitfish Production and Management program area, research and extension efforts were focused in the following specific areas: 1) fish disease biosecurity; 2) control of aquatic predators;

The School of Agriculture, Fisheries and Human Science supports two Extension goals under Goal 2. The Agriculture department program promotes HACCP workshops for small meat and poultry processors in central and southern Arkansas. The scope of this program includes both processors and consumers of processed meat and poultry by supporting a safe food supply. The FF-NEWS Program at the University of Arkansas at Pine Bluff is a comprehensive, culturally sensitive nutrition education intervention program for food stamp participants. The program offers curriculum modules on food quality and basic food sanitation. Program participants are taught lessons on safeguarding the family's health. Special emphasis is placed on causes of food borne illnesses, developing standards of personal and kitchen cleanliness and following safety practices.

Goal 3 presents 2 research programs and one Extension program that address the improved nutrition and well being of individuals through research with new products and improving diet and health behaviors and practices.

There are two programs under Goal 4. One continuing research program (Program 8) supports goat production as an alternative to large ruminant (cattle) production for small and limited-resource farmers. Goats are generally reported to have less of a negative impact on the environment compared to swine and cattle. The scope of this program is broad because information developed can be utilized nationally by goat producers or potential producers. One new integrated 1890 Research and Extension program (Program 4) involves whole farm nutrient management and water quality. The scope of this program is also national with potential global impact. Animal waste (nutrient) can affect water quality. This integrated program combines research of existing methods of nutrient management with Extension by demonstrating whole farm nutrient management and water quality sustainability.

There is one research program in the Agriculture Department that supports goal 5, Socioeconomic impact of agricultural policy on minority and Limited-Resource Farmers. This is a study of how agricultural policies at the state and nation influence the economic opportunity and quality of life for minority and limited-resource farmers in its earliest stages of development. The scope of this program is national because of its potential influence on state and national policies.

The Department of Human Sciences has two research programs in support of goal 5. Both of these projects were limited in accomplishments due to the death of one faculty member and the resignation of the other. Plans and limited results are included in the report.

Numerous Extension programs were implemented and reported on under Goal 5. These dealt with families and youth and targeted increasing and strengthening individual and family skills needed for self sufficiency. Two of the programs also emphasized career awareness in the field of agriculture.

Specific research and extension needs in Aquaculture identified from stakeholder input included: 1) enhancing largemouth bass recreational fishery in Arkansas River; 2) improving growth and survival rates of hybrid striped bass fry and fingerlings; and 3) improving recreational fishing in farm ponds and in community fishing ponds. The Arkansas Game and Fish Commission (AGFC) needed quantitative stock structure data to characterize largemouth bass fisheries throughout the river. As a supplement, we included spotted bass in assessments.

The following projects were developed and implemented to respond to the identified needs under Goal 5 as an integrated research and Extension program.

1. Enhancing Largemouth Bass Recreational Fishing
2. Improving Growth and Survival Rates of Hybrid Striped Bass Fry and Fingerlings
3. Improving Recreational Fishing in Farm Ponds and in Community Fishing Ponds
4. Youth Fishing Education

Goal 1: Research Program 1--Crop Protection System

Key Themes: Agricultural Profitability, Innovative Farming Techniques

Focus Areas: Improves Pest Control and Food Quality and Protection

- a. Brief description of activities** - In 2005 activities included the screening of alternative insecticides for insect control in tomatoes. Alternative insecticides (Bio Neem, neem oil; BotaniGard, *Beauveria bassiana*; Conserve, spinosad; Garlic oil, M-Pede, potassium salts of fatty acids; Safer Soap, potassium salts of fatty acids; Ultra fine Oil, paraffinic oil), and a synthetic organic insecticide (Orthene), were evaluated for the control of potato aphid in tomatoes. A pre-spray estimate of aphid density, 0 = none, to 5 = 50% of plant leaves with aphids, and post spray estimate 5 and 14 days after spraying were used to evaluate insecticides. Ultra fine oil, BotaniGard and Bio Neem had the largest reduction in aphid estimates after 5 and 14 days. The other insecticides did not reduce estimates more than the non treated controls.

In 2005, different colored mulches, black, silver, red, clear and green, were evaluated in the production of turnips and mustards. On each mulch color, 6' plots were established and treated with alternative insecticides (Bio Neem, neem oil; Conserve, spinosad; and Safer Soap, potassium salts of fatty acids), a synthetic organic insecticide (orthene) and a non treated control. Plots were sprayed at the 2-3 leaf stage and twice more at 2 week intervals. All the leaves on 2' of row per plot were harvested and sorted. The damaged and marketable leaves were weighed and a percent leaf damage of the total harvest was calculated. No one pest were observed at levels which would warrant a specific treatment but control plots sustained 46% to 60% leaf damage at harvest. This percent damage for control plots was significantly higher than the insecticide treatments spinosad, safer soap, and neem. There was no significant interaction between mulch and insecticide. The silver and red mulch produced the highest non damaged yields. The plots with no mulch had higher total yields but had more damaged leaves.

During the spring and summer 2005, bush beans, zucchini, crook neck squash, sweet corn and tomatoes were grown using different colored mulches (Black, Silver, Red, Green and Clear). Plots were picked twice weekly and yields were recorded. Vegetables grown on the black or black silver mulch produced more than using the other colored mulches. Noted exceptions were from zucchini and bush beans grown on green mulch which had yields similar to black mulch. Considerable weed growth was observed under both the red and clear mulches which may have impacted yields. More research is warranted to determine if a colored mulch should be used with a specific vegetable from optimum production.

Publications:

Katayama, R. W.. 2005, Barrel Irrigation system for small plots using drip irrigation and plastic mulch. Arkansas Agriculture and Rural Development. In press.

Poster: Onyilagha, Joseph C. and Katayama, Robert W. 2006. Comparative Effect of Plastic Mulch on Yield and Agronomic Performance of Vegetables. 50th Rural Life Conference, University of Arkansas at Pine Bluff, February 10. Poster.

- b. Impact(s)** - Alternative insecticides which are generally considered safer than synthetic insecticides can vary in efficacy depending on the insect pests. The trials conducted this year, which had low insect pest levels, have shown that the vegetable producer can choose products such as neem oil and spinosad to reduce insect numbers such as potato aphid in tomatoes and obtain results similar to organic pesticides. The use of alternative insecticides, spinosad, safer soap, and neem in greens, turnips and mustards was shown to reduce insect damage to similar levels as synthetic

organic insecticides. Growers can choose the less environmentally damaging alternative insecticides and expect insect control efficacy in greens similar to organic insecticides. Vegetable yields can be increased using colored mulches when compared to the traditional black mulch. The increased cost of colored mulch would need to be compared with the increase yields to determine if using other than black mulch would be advisable.

- c. **Scope of impact -** National
- d. **Funding** CSREES - \$114,119
State - \$59,056
Total - \$173,175

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GOAL 1: Research Program 2—Alternative Crop Production

Key Themes: Agriculture Profitability and Small Viability

Focus Areas: Plants and Plant Products

- a. Brief description of activities** – Field plot studies that evaluate the effect of herbicide use on southern pea yields are being conducted. Enterprise budgets are being developed that can be used to measure the increased profit potential of using herbicide for weed control in southern peas. Southern pea variety tests were conducted at three locations in Eastern Arkansas. An irrigation study comparing furrow irrigation vs. no irrigation on southern pea yield was conducted at the Lonoke site. In the cultivar and breeding trials, seven high-yielding cowpea (fresh pea) varieties have been selected and are being used as parents in a cross-breeding program. These varieties are LA Purple Hull (QuickPick), Early Scarlet, Mississippi Pinkeye, Top Pick Pinkeye, Empire, Empress and TX Pinkeye. In addition, 500 other lines are being evaluated.
- b. Impact(s)** – Southern peas are one of the most popular and profitable alternative crops grown by small and limited resource farmers in the South. However, many of these limited resource farmers do not use herbicide and thus have poor weed control. Studies determined that there is economic value in using herbicide – Treflan (Trifluralin) and Pursuit for weed control. Tests were conducted on two varieties of peas at the UAPB experimental farm in 2005. Yields of peas (fresh pod) were increased from 1 to 72% (average increase 46%) following the use of Treflan and Pursuit herbicides for weed control. On a per acre basis yield increases ranged from .8 to 58.6 bu/A (average increase 37.6 bu/A). The level of response to herbicide use was also related to weed pressure in the test plots. Test plots in 2005 were heavily invested with broadleaves (morning glory, red root pig weed and etc.) and as a result Treflan produced only 0,8 bu/A yield increase above the weedy check.

Enterprise budgets developed for southern peas (fresh market (2005) indicated that returns were \$1,312 per acre with Treflan and \$2,236.80 per acre with Pursuit when peas were sold at \$16.00 per bu. The production cost was \$830.38 per acre with Treflan and \$846.38 with Pursuit. After production costs, profit per acre would be \$481.62. with Treflan and \$1,390.42 with Pursuit. Consider, for example, farmers involved in the Small Farm Project-University of Arkansas at Pine Bluff. About one-third (or one-hundred) farmers involved in this project are growing southern peas. Each farmer grows an average of 2 acres of peas. Thus, the total number of acres of peas grown by farmers is approximately 200 acres. The economic benefit of growing southern peas with Treflan is approximately \$262,400.00 (200 acres @ \$1,312 = \$262,400). The gross returns for growing southern peas with Pursuit is approximately \$447,360 (200 acres @ \$2,236.80 = \$447.360). Other small farms in the Lower Mississippi Delta region should be able to reap similar per acre benefits from the use of herbicides. Dry shelled pea yields averaged (18 varieties) 1236.4, 1098.5 and 815.8 lbs/A at Pine Bluff, Marianna and Lonoke locations, respectively.

Irrigation increased dry pea yield by 168.5 Bu/A or 19.6% over no irrigation. Yield increases varied with pea variety from 22.9% (Coronet) to 15.9% Arkansas Blackeye. Yield increases from irrigation are more likely to be received when peas are planted in late June and July.

c. Scope of Impact – State and Regional

d. Funding CSREES - \$200,354
State – 103,682
Total \$304,036

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GOAL 1: Research Program 3 – Minimally Processed Value-Added Products

Key Theme: Adding Value to Agricultural Products

Focus Areas: Food Nutrition and Health

- a. **Brief description of activities** – Development of minimally processed/value-added products is a new research program. Fresh-cut fruit and vegetable products were selected to explore minimally processed/value-added potential. Research in postharvest quality and safety of fresh-cut fruit and vegetable products was selected to initiate the research project. Literature reviews in fresh-cut fruits and vegetables were conducted to collect previous data and scientific journal articles. From literature reviews, quality loss of fresh-cut fruits and vegetables is due to deterioration and microbial growth. To overcome these qualities and safety problems, and to extended shelf-life of fresh-cut products, post-harvest treatment and preservation technology including utilization of antibrowning agents and modified atmosphere packaging needs to be applied and maintained during the whole chain from harvest to consumption.

This project is in the early stages. A new lab facility for Food Safety and Value Added Processing is currently under construction and anticipated to be completed within the coming year. The research scientist spent most of the year working with the design and construction of this facility and in planning for equipping the facility.

- b. **Impact(s)** – Minimally processed fruits and vegetables including fresh-cut products will retain fresh-like sensory qualities and provide the health benefits of fruits and vegetables to consumers. Currently, packaged pre-cut salads remain the fastest selling grocery item in the U. S. grocery stores, followed by pre-cut vegetables and pre-cut fruits. Development of fresh-cut products will offer produce growers and farmers in Arkansas an opportunity to increase sales by adding value to raw agricultural commodities and will offer consumers locally produced ready-to-eat produce that is convenient, nutritious and good tasting.
- c. **Scope of Impact** – Region
- d. **Funding** - CSREES - \$16,285
State - \$48,220
Total - \$64,505

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GOAL 1: Research Program 4 – Efficiency and Profitability of Hog Farms – Production Techniques to Improve Efficiency and Profitability of Hog Farms in Southeast Arkansas

Key Theme: Animal and Animal Products

Focus Area: Sustainable Agriculture

- a. Brief description of activities** – Work with small independent hog producers is continually requested by members of the Agriculture Advisory Committee. This project was designed to meet that request. A survey was designed and tested for reliability and validity and was sent/given out to past and current hog farmers, and others who are interested in the hog business. Those contacted were met during official and unofficial meetings/visits, and through extension personnel. Response has been very poor, and we are currently stepping up effort to encourage more people to respond prior to our analysis of the responses.
- b. Impact(s)** – The project has just started and no results are available. However, the project is expected to identify a number of issues of concern related to hog production management practices. That will pave the way to address constraints related to hog production strategies. The project is expected to develop cost-effective production strategies and the best alternatives for efficient and sustainable hog production. The project will develop market surveys and enterprise budgets that fit the small farm situation, and also identify best hog enterprise combinations that maximizes net returns for a fixed amount of land, capital and management resources. The project will result in a number of publications and education materials through which research information is disseminated.
- c. Scope of Impact** – State and Regional
- d. Funding** - CSREES - \$96,934
State - \$50,165
Total - \$147,097

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GOAL 1: Research Program 5 – Engineering Insect Resistance in Cowpea through Gene Transfer

Key Theme: Plant Breeding, Genetics

Focus Areas: Biotechnology

- a. Brief description of activities** – Shoot meristem is being used as an explant to obtain an efficient regeneration system in cowpea. Different cultivars such as Early Scarlet, Quick Pick, Coronet and 87-435-68 are currently being tested for regeneration response. The shoot meristem was isolated from a 5-7 day old mature embryo that was cultured on MS medium containing 2.0 mg/L BAP. Subsequently, the isolated shoot meristem was cultured on MS medium containing 0.2 mg/L BAP (Fig. 2A). Concentration of BAP higher than 0.5 mg/L or the addition to Zeatin or/and Kinetin resulted in profuse callus growth. After 3-4 weeks, shoots were separated from each meristem and cultured on MS medium for rooting. After three weeks, the rooted plantlets were transferred to peat pellets and subsequently to the greenhouse. The plants were allowed to flower and fruit. No phenotypic and genotypic abnormalities were observed. At least 3-4 plantlets were obtained from each meristem.
- b. Impact(s)** – We are currently screening various cowpea cultivars to establish the regeneration system. The efficiency of regeneration in all four cultivars ranges from 86-94% demonstrating significant improvement over the existing published protocols (1-32%). This is significantly higher than the frequencies reported in the published reports and will enhance our chances of getting insect resistant transgenic plants in cowpea. Cowpeas that resist various insects will greatly benefit limited-resource, small acreage cowpea farmers in Arkansas. The results from this project will also benefit cowpea farmers from other states in southern United States and in developing countries that produce large volumes of cowpea.
- c. Scope of Impact** – State, Nation and World
- d. Funding -**
CSREES - \$98,860
State - \$51,160
Total - \$150,020

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GOAL 1: Extension Program 1 - Adoption of New Best Management Practices

Key Themes: Innovative Farming Technologies, Precision Agriculture

Focus Areas: Improved production practices for limited resource producers

- a. Brief description of activities** – In a stakeholders meeting during 2004, participants said “the lack of rapid adoption of new best management practices” is one of the factors likely to affect their row crop operations in the future. Our demonstrations were designed to establish those best management practices and to assist farmers in adopting new practices.

Field 6A on the Lonoke Farm site was used to plant 8 acres of Delta Grow 5960 Round-Up Ready Soybeans in a no-till demonstration during 2005. This field had previously been limed (0, 1 ton/A, 2 tons/A) for a lime study. It was sprayed with 22 oz. of Round-Up Ultra Max herbicide/acre prior to planting, fertilized and treated two (2) additional times with Round-Up Max during the growing season. This production method required four (4) trips across the field. The soybeans were not irrigated and they were produced at a cost of \$82.73/Acre. The average yield was 30 bushels/acre and the average income per bushel was \$5.25. Thus, the gross income was approximately \$157.50/Acre and the net income was approximately \$74.77/Acre excluding labor.

Field 6B contained 61 acres of non-irrigated conventionally produced Delta Grow 5630 Round-up Ready Soybeans. Except for tillage practices, these soybeans were treated the same as those in Field 6A. Conventional production practices consisted of disking two (2) times, harrowing one (1) time, fertilizing one (1) time, hipping one (1) time, cultivating one (1) time and applying round-up two (2) times post plant. This method required eight (8) trips across the field prior to harvest while the no-till method required four (4) trips. The cost/acre to produce the conventional soybeans was about \$110.56 as compared to \$82.73 for the no-till soybeans. Soybeans on Field 6B yield an average of 45 bushels/Acre. The gross income/Acre was \$236.25 and the net income was \$125.69. Part of the difference in increased yield for Field 6B may be attributed to the difference in soybean varieties (5960 vs. 5630). This is only one year of data and more testing is needed.

The irrigation demonstrations on soybeans were conducted on Fields 11D where 7.2 acres were grown and on 11E where Delta Grow 5960 soybeans in a conventional production scheme. The soybeans on Field 11D were furrow irrigated two (2) times and they produced a yield of 30 bushels/Acre. Those on Field 11E were flood irrigated two (2) times and yield 29 bushels/acre.

- b. Impacts** -- The short term results are to make producers aware of the cost effectiveness and potential environmental benefits of using best management practices for crop production. As producers become more knowledgeable of different production techniques, it is envisioned that they will develop skills and be motivated to adopt these practices.

If we can show the cost effectiveness of the approaches, we believe that LRF and SDF will practice what they have learned. Thus, a change in behavior should be evident and decision making about production techniques should be improved.

- c. Scope of impact:** Arkansas
- d. Funding:** CSREES - \$58,781
State - \$202,785
Total - \$261,566

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GOAL 1: Extension Program 2 – Beef Herd Improvement

Key Theme: Agricultural Competitiveness

Focus Areas: Collaboration among agencies and other programs

- a. Brief description of activities** - Improvements in the areas of breed selection, herd health, improved herd performance, marketing information, bull fertility and general herd management will improve the profitability and competitiveness of these herds by helping the producer market more calves that weigh more and have more market value.

During FY '05 the main priority was to establish a working relationship or collaborative effort with Arkansas Farm and Land Development Corporation (AFLDC) and a group of their cooperators on a beef cattle project and with the Silas Hunt Foundation and UAPB Small Farmer Program and a group of their cattlemen. ALFDC is located in eastern Arkansas and Silas Hunt is located in Southwest Arkansas.

Initial meetings were held with ALFDC in Fargo in December '04 and January '05. Plans were made to conduct a series of beef production meetings in late 2005 and early 2006 and conduct a field day in April 2006 on beef management practices.

An initial meeting was held in March with the Silas Hunt Board and the UAPB Small Farm staff in Ashdown. We agreed to work together with their beef cattle clientele. The next day was spent on farm visits in Little River, Howard and Hempstead counties. Additional trips were made May and August for farm visits and to continue meeting more of their cooperators.

Activities also continued with some other producers on the cow herd performance test program and general herd management.

- b. Impacts** - The main impacts with these two groups (AF&LDC and Silas Hunt Foundation/UAPB Small Farms Program) during FY '05 has been in the areas of conducting meetings, farm visits, providing counseling on herd or farm problems, providing educational materials, and developing partnerships.

Working with the producers in these two areas of the state, the short-term results have been aimed at developing an awareness and knowledge of animal management practices to improve their herds. Long range impacts are aimed at adoption of new and improved management practices and enlightened decision making with the end result being increased farm profits.

Work has continued with several other producers. One of these is on the cow herd performance test program. In FY '05 his herd average adjusted weaning weight was 595 pounds and he sold six yearling bulls to other cattlemen as herd sires. He has adopted many management practices and has been able to stay in the cattle business.

- c. Scope of Impact:** State of Arkansas

d. Funding: CSREES - \$100,159
State - \$40,502
Total - \$140,660

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GOAL 1: Integrated 1890 Research and Extension Program – Program 1 Catfish Production and Management

Key theme: An agricultural system that is highly competitive in the global economy

Focus Areas: Profitability

- a. Brief description of activities** -- Specific research and extension needs identified from stakeholder input included: 1) to delineate market preferences for farm-raised catfish; 2) to identify management and feeding options to improve efficiencies and lower costs; 3) to develop and implement biosecurity initiatives to reduce losses due to diseases; 4) to validate research recommendations on commercial farms; 5) to develop farmer-friendly data-management tools adapted to the requirements of catfish farms; and 6) to measure the economic impact of specific programs and services of the Aquaculture/Fisheries Center.

The following projects were developed and implemented to respond to the identified needs:

1. Market Preferences for Farm-raised Catfish
1. Improved Management Options to Improve Efficiencies and Lower Costs
2. Development of New Technologies for Catfish Farms
3. Impacts of Drift of Herbicides on Fish Pond Water Quality
4. Fish Disease Biosecurity
5. Fish Farm Data Collection and Record Keeping
6. Catfish Research Verification
7. Impacts of Aquaculture/Fisheries Center Programs

1. Market Preferences for Farm-raised Catfish

a. Brief description of activity: Nationwide surveys were conducted of restaurants, and supermarkets. In all, 98 restaurants and 197 supermarkets participated in the survey. Following the descriptive analyses, logit and nested logit models were developed to attempt to identify groups of restaurants and supermarkets most likely to purchase catfish.

b. Impact – Survey results showed that, in restaurants that served catfish, the five most commonly sold types of seafood were: catfish, shrimp, tuna, flounder, and bass. In restaurants that did not serve catfish, the most commonly sold types of seafood were: shrimp, salmon, tuna, crab, and clams. The factors that had the greatest effect on the decision to purchase catfish were quality and reliability of supply. These were followed by price and taste. In the supermarket survey, freshness and off-flavor were the most often expressed concerns. In supermarkets that sold catfish, the five most frequently sold types of seafood were: shrimp, salmon, catfish, tilapia, and cod while in supermarkets that did not sell catfish, the most frequently sold types of seafood were: shrimp, salmon, cod, pollock, and tuna.

Contact Information

Market Preferences for Farm Raised Catfish

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2. Improved Management Options to Improve Efficiencies and Lower Costs

a. Brief description of activities -- Pond production studies were conducted to compare production and economic efficiencies associated with various stocking densities in both single and multiple batch. Stocking densities ranging from 8,750 to 34,000/ha were tested in replicated studies in both single and multiple-batch. Mathematical programming models were developed to identify the optimal size of fingerling to understock in catfish multiple-batch production ponds.

New enterprise budgets were developed for catfish farming. Cost of production survey data were used to identify farm sizes based on cost structure thresholds related to labor patterns. Five farm size groups (<100 acres, 100-200 acres, 200-300 acres, 300-800 acres, and > 800 acres) were identified. Within each farm size group, the mean farm sizes of 60 acres, 131 acres, 256 acres, 431 acres, and 1,007 acres were identified. The enterprise budgets were used to estimate net returns above labor, management and risk, net returns above risk, and net returns above cash costs as well as breakeven prices and breakeven yields above variable costs and above total costs. Additional scenarios were analyzed that included: use of growout ponds to produce fingerlings from fry purchased from other sources, installation of a hatchery, leasing ponds instead of owning ponds, and hiring a seining crew instead of contracting out all seining and harvesting.

Results from the pond studies showed that yield increased with stocking density in single-batch production, but not in multiple-batch production. Fish growth decreased with increasing stocking rates in single-batch production but not in multiple-batch production. Increasing feeding rates above 112 kg/ha did not adversely affect feed conversion ratios and no evidence was found to limit daily feed rations to 112 kg/ha. There were no water quality differences in either study due to stocking densities. Feed conversion ratios did not differ due to stocking density in either study. Results of the mathematical programming studies showed that the optimal size of fingerling to understock in multiple-batch production is a 12.7-cm fingerling. Model results were robust with respect to wide variations in fingerling prices, fish prices, interest rates, and survival rates. The majority of fingerlings stocked were produced on farm. Restricted levels of operating capital resulted in switching fingerling production management to not thinning during the fingerling production period.

Sixty-six producers attended the workshops. Meetings were followed by a news article “Improving farm efficiency” that appeared in Arkansas Aquaculture.

b. Impact: We are receiving many reports from farmers indicating that they are following the stocking recommendations, managing farms based on cash flow analyses, and tracking their costs as compared to the UAPB enterprise budgets. The feedback received is that they are using the new budgets as a guide to indicate where they can look to improve efficiencies in their farm business. Catfish farmers are reporting higher yields and lower costs as a result of adopting the production recommendations that have been developed from this work.

Contact Information

Improved Management Options to Improve Efficiencies and Lower Costs

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3. Development of New Technologies for Catfish Farms

a. Brief description of activity: There has been increasing interest in the production of channel by blue catfish as a means of increasing efficiencies on catfish farms. However, the techniques for producing the hybrid fry need to be improved dramatically before large-scale adoption will become a reality.

Work continued in 2005 in testing a barrier system as a means of increasing production efficiencies in pond aquaculture. A sampling trawl system has also been developed and demonstrated as a tool for collecting samples from catfish ponds.

In the spring of 2005, an individual pen spawning chamber system was developed and tested that allowed individual female catfish to be kept separate throughout the injection and ovulation process. This reduces the amount of handling and weighing and improves the odds of finding individual females at the peak of ovulation.

Another hybrid catfish development in 2005 was a spreadsheet tool that calculates the amount of crude carp pituitary required base on the total weight of females to be injected. The spreadsheet tool calculates the volume of sterile saline required and steps the producer through the process of mixing and diluting the injection solutions. This tool has eliminated calculation errors and reduced waste.

Preliminary results indicate no major advantages of keeping sizes separate with a barrier system in a pond. This year all fish cultured in the pond will be contained by the barrier system to check for other possible efficiency advantages.

b. Impact: One farm has adopted the hybrid pen system technique and will use this system in the production of hybrid catfish in 2006. Another benefit of this pen system is that it allows for the use of the ultrasound technology developed at LSU in aquaria to be utilized in a large scale production facility.

A catfish trawl was pulled across three catfish research verification ponds before the inventory of the ponds was assessed. The preliminary results will be used to design a more exhaustive study on the efficiency and accuracy of a catfish trawl as an inventory assessment tool. If the trawl is proven to be an accurate and reliable method to capture a representative sample from commercial catfish ponds, it could be used to assess the size distribution of fish inventories and therefore facilitate the scheduling of future fish harvests and increase cash flow.

The trawl system was employed by Dr. Andy Goodwin and graduate student Kelly Winningham to collect age structure information from commercial catfish farms. This work has led to the development of a Southern Regional Aquaculture Center project on collecting pond inventory information. It also has been adopted by the Arkansas Game and Fish Commission Joe Hogan Hatchery to harvest small quantities of fish.

The Arkansas Game and Fish Commission is able to harvest small quantities of catfish with the trawl with much less labor and less time. This improves their ability to meet the requests for stocking various water bodies throughout the state.

Contact Information

Development of New Technologies for Catfish Farms

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4. Impacts of Drift of Herbicides on Fish Pond Water Quality

a. Brief description of activity -- Much of Arkansas aquaculture production occurs in ponds immediately adjacent to row crops that are sprayed with pesticides applied by aircraft. Farmers have long suspected that drift produced problems in ponds, but there is little data available to help farmers, applicators, and state regulators evaluate the real risks. Studies have been conducted to determine the toxicity of common pesticides to catfish, baitfish, ornamental fish, and shrimp. Additional studies have examined the potential of herbicide drift to kill planktonic algae in ponds. Loss of these algae would be expected to cause water quality problems and disrupt the food chains of some fish species.

Herbicide drift from Basis Gold (atrazine) and propanil produced few and minor impacts on pond water prepared for fry stocking and would not affect fry. The studies examined the following:

Aquashade, added prior to fry stocking to reduce benthic algae growth, did not affect phytoplankton biomass or composition: preliminary to 2006 study.

Aquashade, added to ponds on 3 commercial catfish farms during the winter-spring, did not affect planktonic algae. Aquashade and algae effects on cormorant usage are being analyzed. Algae is being correlated with aerial images.

New aerially-applied herbicides, ricestar, clincher, regiment and poast, were evaluated for drift effects on pond plankton and water quality. No impacts were found.

b. Impacts – Data collected from the studies can be used to demonstrate the safety of pesticides used in row crop agriculture related to aquaculture crops also grown in the area. Increased public awareness of the safety of aerial application of these pesticides will allay environment concerns of the public.

Contact Information

Impacts of Drift of Herbicides on Fish Pond Water Quality

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5. Fish Disease Biosecurity

a. Brief description of activity-- Infectious diseases are a major source of loss in commercial aquaculture. Reduction of these losses requires timely disease diagnosis, accurate management recommendations, and cooperative development of biosecurity programs. UAPB maintains 4 fully equipped fish disease diagnostic laboratories. These have diagnosed more than 2,300 cases in the last year and conducted numerous fish health inspections. Biosecurity education programs have been presented to the industry. New rapid diagnostic tests for viral disease of fish have been developed.

Inspections of catfish allowed shipments of 70,000 lbs of fish to Utah for urban fishing program. 700 diagnostic samples were submitted to the Lake Village laboratory, which included 300 fish disease cases and 400 water samples.

A developing issue being addressed is with the catfish trematode. This parasite can affect fish's growth and marketability and have a severe negative impact on the catfish industry and local economy. Efforts to inform producers of potential impact of the trematode included two news articles, "Update on the catfish trematode" in Arkansas Aquafarming and "Exercise caution with whole pond copper sulfate treatments", and an oral presentation "Watch for the catfish trematode" at the Catfish Farmers of Arkansas Mid-Year Meeting.

Efforts to increase industry awareness of biosecurity have focused on educating catfish farmers about the potential of exotic foreign catfish diseases to impact domestic catfish production. This has been done through articles and posters at producer meetings.

b. Impacts – An algal monitoring program was re-initiated in the "salt belt" of Chicot County. A marine algae species reappeared this past fall. Previous appearance of the algae resulted in devastating losses for producers, over \$1 million in fish losses in 2000-2001. So far, only one farm has experienced a minor fish loss due to the algae this fall.

Catfish industry trade associations have decided that participation in the joint USFWS/USDA/NOAA National Aquatic Animal Health Program is important to insure that the industry is protected from foreign diseases.

Savings estimates for the producers are \$1.8 million for disease treatments and \$200,000 for the water quality treatments. If our diagnostic program saves only 10 % of the fish in ponds associated with diagnostic cases submitted to our laboratories (a very conservative estimate), the savings to Arkansas farmers amount to more than \$7,000,000/yr. In addition, more than \$1,000,000 in fish every year are exported to other states and countries based on health inspections available only at UAPB.

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Fish Disease Biosecurity

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6. Fish Farm Data Collection & Record Keeping

a. Brief Description of Activity -- Two computer models and instruction manuals were developed to facilitate the generation of cash flow budgets based on feeding rates and fish inventories.

The models and instruction manuals were presented to commercial catfish farmers through workshops, the internet, aquaculture publications, and personal communications. These outreach efforts increased the awareness of catfish farmers on the effect of feeding rates and feed allocation among ponds on farm cash flow.

After several field trials on commercial catfish farms, an affordable and reliable means of acquiring data digitally in the field has been identified. Handheld computers (Pocket PC) was revealed to be the most practical tool to efficiently acquire feed, oxygen and aeration data from the pond bank. The software on the Pocket PC was shown to be easy to use by any farm employee. Once the data is collected on the Pocket PC, it can be transferred through the phone line to a central database. The database can then be accessed by the farm owner and farm manager round-the-clock through the internet. The technology was shown to be functional and helpful for the Catfish Research Verification Program to acquire production data in a timely manner. However, further improvements need to be made to make the system more attractive and useful to farm managers and owners. The next phase of the project will be to develop web based data analysis tools and reports to facilitate management decisions and the analysis of the enterprise performance over time.

b. Impacts --- A number of farmers have adopted the use of the spreadsheet models to manage their farm operations based on cash flow and to allocate feed across those ponds that will contribute most to cash flow. Many farmers now are scrutinizing their cash flow on a monthly basis before making management decisions and follow up with an intensive financial analysis of their total operation on a quarterly basis.

A number of farmers have indicated that use of these spreadsheet models allowed them to manage their farms over the past several years of financial distress in a way that enabled them to survive financially. These spreadsheets also allowed them to compile the information needed to keep their cash flow budgets updated easily. The result was that they could spend more time thinking and analyzing their business instead of on data entry.

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Fish Farm Data Collection & Record Keeping

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7. Catfish Research Verification Program (CRVP)

a. Brief Description of Activity---Research Verification is an Extension program in which management protocols are developed based on the available set of research-based recommendations. Cooperating farmers are identified who agree to manage two ponds per farm according to the established management protocols. In 2005, there were five verification ponds distributed among three cooperating farms in the Catfish Research Verification Program.

b. Impacts --- The CRVP increased the awareness of catfish farmers of the Extension recommendations for catfish growout production such as the importance of daily feeding to satiation, moderate stocking densities, and aeration to improve their production and profitability.

The CRVP provided a unique insight into the catfish industry that helped university researchers get a better understanding of current commercial practices and identify areas of catfish production that require further research.

The CRVP increased the awareness of Extension specialists and catfish farmers on the impact of various aeration management strategies on the efficiency and profitability of catfish farms.

The CRVP provided an opportunity to collect some preliminary data to determine the efficiency and accuracy of a catfish trawl as an inventory assessment tool.

The extensive database and accurate estimates of yield and survival that resulted from the CRVP provided the U.S. Risk Management Agency with additional knowledge from commercial catfish growout ponds that will be valuable for quantifying risks involved in catfish farming.

The comprehensive dataset of daily feed inputs, dissolved oxygen concentration, aeration input, inventory assessment, quantity and size distribution of fish stocked and harvested, and water quality that resulted from the CRVP will be valuable to develop and test new computer models to assist farmers with inventory assessment and oxygen management.

The CRVP provided an opportunity to test new computing and wireless communication technologies to improve data acquisition and management on catfish farms.

The average verification pond produced yields 25% to 30% higher than statewide averages.

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8. Impacts of Aquaculture/Fisheries Center Catfish Programs

a. Brief Description of Activity --- An economic surplus model was developed and used to measure the impact of the Catfish Yield Verification Program. A survey of catfish farmers in Chicot County, Arkansas provided data for the analysis. A follow-up study, data development analysis techniques, estimated the marginal value of extension contacts in Chicot County, Arkansas.

b. Impacts --- The adoption of the new farming techniques extended to catfish farmers through the Catfish Yield Verification program resulted in a reduction in the cost of production by 22%. The resulting total economic benefit was \$67 million. A related study examined efficiency factors on catfish farms in Chicot County, Arkansas. This study determined that the Aquaculture Fisheries Center (AFC) extension services in Chicot County generated about \$3.5 million in cost savings among catfish farms, or about \$1,896 per contact with AFC extension specialist.

Contact Information

Impacts of Aquaculture/Fisheries Center Catfish Programs

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c. Scope of the impacts for project 1 thru 8 --- Mississippi Delta Region (MS, AR, LA)

d. Funding for projects 1 thru 8

CSREES Research - \$318,117
State Research - \$ 384,654
Other - \$45,574
Total - \$784,345

CSREES Extension - \$247,983
State Extension - \$200,673
Total - \$448,656

GOAL 1: Integrated 1890 Research and Extension Programs, Program 2 -- Baitfish Production and Management

Key Themes --- A baitfish industry that is competitive in a global economy

Focus Areas --- Profitability

a. Brief description of activities --- Specific research and extension needs identified from stakeholder input included: 1) fish disease biosecurity; 2) control of aquatic predators; 3) nutrients in baitfish broodstock diets to improve egg and larval quality; 4) optimizing hatchery methods; 5) optimizing stocking rates; and 6) improving water quality management.

The following projects were developed and implemented to respond to the identified needs:

1. Fish Disease Biosecurity
2. Control of Aquatic Predators
3. Optimizing Hatchery Methods Through Nutrition
4. Baitfish Research Verification
5. Improving Water Quality Management

1. Fish Disease Biosecurity –

a. Brief description of activities --- Infectious diseases are a major source of loss in commercial aquaculture. Exotic viral diseases of cyprinid fish are a continuing threat to the bait and ornamental fish industries. We now conduct surveillance, inspection, and education programs for 5 dangerous viruses.

Reduction of these losses requires timely disease diagnosis, accurate management recommendations, and cooperative development of biosecurity programs. UAPB maintains 4 fully equipped fish disease diagnostic laboratories. These have diagnosed more than 2300 cases in the last year and conducted numerous fish health inspections. Biosecurity education programs have been presented to the industry and foreign animal disease surveillance programs established in the bait and ornamental fish industries. New rapid diagnostic tests for viral diseases of fish have been developed.

Our surveillance programs have convincingly documented that the reportable SVC virus and devastating Koi Herpes Virus are not present in Arkansas aquaculture. This information is critical in maintaining markets for Arkansas farmers.

Preliminary steps have been taken toward identification of a previously unidentified parasite, the catfish nematode. Data were obtained regarding the prevalence of Goldfish Herpes Virus within the Arkansas goldfish aquaculture industry. It was determined that the vertical transmission of Goldfish Herpes Virus cannot be prevented with formalin treatment of eggs. Samples were collected for research (graduate student project) on the vertical transmission of the ovarian parasite *Pleistophora* sp. in Golden shiners. Information packages were developed and disseminated regarding practical protocols for preventing disease

on fish farms including the management of new fish stocks, disinfecting techniques for equipment and fish eggs (Presentations at industry/extension agent training workshops, Aquafarming newsletter article, SRAC fact sheet, personal letters and direct communications). New quantitative PCR assays were developed and validated to detect the Goldfish Herpes Virus and the Chinese Grass Carp Reovirus,

b. Impacts --- If work done by our diagnostic program saves only 10 % of the fish in ponds associated with diagnostic cases submitted to our laboratories (a very conservative estimate), savings to Arkansas farmers amount to more than \$7,000,000/yr. In addition, more than \$1,000,000 in fish every year are exported to other states and countries based on health inspections available only at UAPB.

Ongoing education in safe biosecurity practices to prevent the introduction and spread of disease within the Arkansas aquaculture industry has resulted in a shift in awareness of potential fish disease risks and impacts.

Numerous companies within the industry have adopted higher standards of biosecurity including:

- a Quality Bait program (disease free) approved by the state legislature
- fish health inspections (twice a year with the farm to maintain certification)
- biosecurity plans for the management of fish stocks
- new methods for seine net disinfection
- fish egg disinfection techniques in hatchery operations

These practices and standards have helped to maintain the disease free status of cultured bait and ornamental fish in Arkansas, which is important for maintaining open markets.

The fish disease diagnostic work conducted at the Lonoke Fish Health Laboratory contributes a significant proportion of the annual case load handled by the four UAPB diagnostic laboratories (more than 2300 cases a year).

The Lonoke Fish Health Laboratory contributes to the surveillance, inspection, and education programs for dangerous viruses including SVCV and KHV.

Our health certification and inspection programs document the disease free status of Arkansas fish and assists farmers in keeping markets open for Arkansas farmers.

More than \$1,000,000 in fish every year are exported to other states and countries based on health inspections available only at UAPB.

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Fish Disease Biosecurity

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2. Control of Aquatic Predators

a. Brief description of activity --- Capture 2EC toxicity to dragon fly nymphs was tested. The effects of water temperature on Capture toxicity to dragon fly nymphs, rosy-red minnows, crawfish. Capture replacement trials - finding an alternative chemical to replace Capture 2EC for the control of aquatic predators have been conducted.

- Studies determined safe dose rates for the use of Capture 2EC with goldfish, golden shiner, koi, fat head minnows, rosy red minnows.
- Studies determined effective dose rates for the use of Capture 2EC against back swimmers and crawfish.
- Studies determined that Capture 2EC treatment is not very effective for the control of dragonfly nymphs and copepods.

They further determined Capture 2EC treatment remains effective in pond water for up to 3 days. The studies determined that the application of chemical treatments (Capture 2EC) using a treatment truck is not 100% effective in achieving full pond coverage with the treatment solution. Results indicate that water quality effects the efficacy of Capture 2EC. However Capture 2EC not as effective/toxic at higher water temperatures. Field observations indicate that consecutive treatments of Capture in a short period of time may affect fish. We are currently investigating alternatives to Capture 2EC treatment for the control of aquatic predators.

b. Impacts --- The section 24C label for using Baytex for the control of aquatic predators (dragon fly nymphs) in bait and ornamental fish ponds was withdrawn in November 2004, leaving fish farmers without a legal alternative treatment.

An Arkansas label for the use of Capture 2EC for this purpose was newly acquired in early 2005, following research conducted at UAPB Aquaculture Fisheries Center. Assistance is being provided to farmers and regulators in three other states that are interested in new Capture 2E labeling.

Our applied research on Capture treatment for the control of aquatic predators provided baseline information contributing to the development of treatment recommendations.

Subsequent treatment recommendations were disseminated to industry members and were adopted by industry immediately during the 2005 production season.

Without the legal and safe use of the Capture treatment, the baitfish and ornamental fish aquaculture industry in Arkansas would have faced devastating financial loss during the 2005 production season due to predation by aquatic predators and/or chemical treatment misuse.

When left untreated, aquatic invertebrates have a significant impact on the production and harvesting of bait and ornamental fish with losses reported by farmers to be up to 50% in ponds with heavy infestations. If such infestations occur in just ¼ of production ponds, then the labeling and subsequent bioassay work with Capture 2E is likely to have saved at least 1/8 of the total value of the 2005 crop and may have prevented losses of up to 50% on farms where infestations are severe.

Contact Information

Control of Aquatic Predators

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3. Optimizing Hatchery Methods through Improved Nutrition

a. Brief description of activities --- Fathead minnow producers were interested in substituting a lower cost feedstuff, corn gluten feed, in place of commercial fish feed during the initial rearing period for fry, and several producers were using the product. Fathead minnows spawn repeatedly over a prolonged spawning season, placing an enormous strain on female fish. There was concern that the quality of eggs and fry produced later in the spawning season would be lessened, reducing growth and survival of the young. However, a 12-pool study revealed that growth of fish fed the corn gluten feed was only half that of fish fed commercial fish feed, and the condition of fish fed corn gluten meal was significantly poorer as well. Results indicated that reducing costs by using corn gluten feed dramatically reduces fish production.

Testing of various fish diets found that feeds with the least expensive feedstuffs (vegetable meals and poultry fat) were still adequate for fathead minnows, as various indices of reproductive success (egg number, egg diameter, hatching percentage, larval length and larval stress tolerance) did not differ significantly among tested diets.

b. Impacts --- 1) Fathead minnow broodstock fed practical diets containing 10% lipid as poultry fat (n-6 fatty acid source) or menhaden fish oil (n-3 fatty acid source) in combination with animal proteins (poultry +fish meals) or plant proteins (mostly soybean meal) had similar indices of reproductive success including egg number, egg diameter, hatching percentage, larval length, and larval

stress tolerance. (2) Fatty acid analysis of the eggs is still in progress. (3) The least expensive feedstuffs (vegetable meals and poultry fat) appear adequate for broodstock diets that support the desired production levels in fathead minnows in outdoor pools. Implementation of these results would reduce diet cost.

Contact Information

Optimizing Hatchery Methods Through Nutrition

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4. Baitfish Research Verification Program (BRVP)

a. Brief description of activity -- Research Verification is an Extension program in which management protocols are developed based on the available set of research-based recommendations. Cooperating farmers are identified who agree to manage two ponds per farm according to the established management protocols.

b. Impacts --- The BRVP increased the awareness of baitfish farmers on the Extension recommendations for golden shiner production such as the importance of adequate feeding and aeration rates to improve yield, survival, and fish growth. Those recommendations will benefit baitfish producers interested in improving their production and profitability.

The BRVP provided a unique insight into the baitfish industry that helped university researchers get a better understanding of current commercial practices and identify areas of golden shiner production that require further research.

The BRVP triggered a new research project on the effect of high stocking densities on yield, growth, and survival of golden shiners, because the BRVP revealed that some commercial producers were stocking fry at rate higher than what was previously thought.

The BRVP triggered a new research project on the distribution of golden shiners in aerated ponds, because the BRVP suggested that golden shiner juveniles subjected to low dissolved oxygen in a pond will not move towards an aerated zone.

The extensive database and accurate estimates of yield and survival that resulted from the BRVP provided the U.S. Risk Management Agency with additional knowledge from commercial golden shiner ponds that will be valuable for quantifying risks involved in baitfish farming.

The extensive database and accurate estimates of yield and survival that resulted from the BRVP will be valuable to baitfish producers that are studying the possibility building a golden shiner hatchery and using fry-transfer management strategies to intensify their production.

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Baitfish Research Verification Program (BRVP)

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5. Improving Water Quality Management

a. Brief description of activity -- Water quality monitoring and management is critical to a successful aquaculture business. Individual and group training were conducted on calibrating oxygen meters, on the costly effects of un-necessary treatments, aquatic weed identification, and alkalinity testing.

Clients conducted numerous routine interstate shipments of live fish. Several hundred formal certificates per year are signed to certify good health of fish submitted prior to interstate transport.

Reliable, current information was disseminated to mass clientele through Aquafarming newsletter. Clients updated mailing addresses, to indicate continued interest in receiving the newsletter. Clients traveled hundreds of miles to attend meetings based on information included in newsletters. Clients communicated appreciation for information provided in newsletters.

Several formal trainings were conducted for AGFC and new CES agents in aquatic plant identification and management.

On-going routine testing of total alkalinity with pretty much EVERY water sample submitted to our lab.

Clients, both area fish producers and UAPB grad students and faculty, learned induced spawning methods, through a series of hands-on workshops.

b. Impacts --- Clients learned to independently calibrate and maintain reliable oxygen meters in practical working situations, around ponds and on fish hauling trucks, learned to monitor oxygen at critical times of day to predict and maintain sufficient oxygen in production ponds.

Clients learned costly harmful effects of baking soda and hydrated lime, and quit using these products for management of carbon dioxide in ponds. Presentations

have been made and the Lonoke County Coop reported much-reduced sales to fish producers of these products. Clients, including many CES Ag Agents, learned to identify common aquatic weeds, and reduced cost and effort for aquatic plant management.

Clients increased control over outcome of spawning of brood goldfish and koi. Clients, including commercial producers, farm pond owners, and CES Ag Agents, learned that a simple water test for alkalinity is necessary to determine whether or not it is appropriate to lime a particular pond. Clients increased production, or reduced costs from unnecessary or excessive lime application.

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Improving Water Quality Management

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c. Scope of Impact for projects 1 through 5 --- Mississippi Delta Region (MS, AR, LA)

d. Funding for projects 1 through 5 –

CSREES Research - \$233,833
State Research - \$194,902
Other - \$14,195
Total - \$432,980

CSREES Extension - \$ 221,658
State Extension \$179,370
Total - \$401,028

GOAL 1: Integrated 1890 Research and Extension Programs—Program 3 Sustainable Vegetable Production

Key Theme: Small Farm Viability, Agricultural Productivity

Focus Areas: Agricultural Systems

- a. Brief description of activities** – In Arkansas, small family farms often grow sweet potatoes for family consumption with additional acreage to enhance farm income. The purpose of this study is to collect information on yield and performance of commercially available varieties and advanced genotypes when grown in Arkansas. Information on various aspects of the selected genotypes is essential in formulating efficient selection and breeding program for yield increase in Arkansas. Fifteen sweet potato varieties/genotypes were conducted at the Agricultural Research Farm of University of Arkansas at Pine Bluff for yields, quality and breeding traits. Cultural practices used by limited resources farmers were followed and were grown on a sandy silt loam soil. The genotypes B94-14 and NC98-608 were found to be very promising in southern Arkansas in respect to marketable yield as well as U.S. #1 grade yield. The genotypes B 94-14 gave significantly higher marketable yield (945.60 bushels/acre) of storage root followed by the genotype NC98-608 (655.90 bushels/acre). Furthermore, the genotypes Georgia jet (577.10 bushels/acre), 94-96 (508.80 bushels/acre) and Beauregard (423.10 bushels/acre) were also found to be a higher yielder in Arkansas. Horticultural traits suited for minimum cultural inputs included reduced cultivation, no chemical weed control or irrigation.

The Extension component of the project was limited because the specialist died in an automobile accident early in the fiscal year and a replacement was not hired until August 2005.

Publications:

Islam, S. Porter, O. A. and Corley, A. V. 2006. Variability of sweet potato (*Ipomoea Batatas L.*) varieties grown in southern Arkansa. Proceeding of the 50th Annual Rural Life Conference, February 10, 2006, University of Arkansas at Pine Bluff, Page 22.

Islam, S., Porter, O. A., Corley, A. V. and Garner, J. O. 2005. Genotypic and phenotypic variation of fifteen sweet potato (*Ipomoea batatas L.*) varieties grown in southern Arkansas. J. Arkansas Agricultural and Rural Development, 6 (In Press).

- b. Impact(s)** – These results will provide Arkansas farmers with information for making informed decisions on which varieties/genotype(s) to plant that will optimize profits and give them information on the soon to be released advanced lines. Planting varieties with higher yields and superior market grades may offset the rising production cost and hopefully encourage the conversion of more acreage into sweet potato production across the state. Farmers should also select varieties that consumers prefer.

- c. **Scope of Impact** – Eastern Arkansas
- d. **Funding** CSREES - \$54,643
State - \$28,277
Total - \$82,920

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GOAL 2: 1890 Extension Program 3 -- Families First-Nutrition Education and Wellness System (FF- News) – Food Safety

Key Theme: Food Safety

Focus Area: Modifying Food Intake Behavior

- a. **Brief description of activities** -- Program participants are taught lessons on safeguarding the family's health. Special emphasis is placed on causes of food borne illnesses, developing standards of personal and kitchen cleanliness and following safety practices.

Considerable time is spent on proper procedure for washing hands and other sanitary practices that contribute to food quality and safety. FF-NEWS staff demonstrated correct procedures to use in purchasing, storing and preparing food to prevent food borne illnesses. Personal hygiene and kitchen sanitation were discussed as means to promote good health. Participants received a list of hygiene practices to follow as well as guidelines to use in keeping the kitchen sanitary.

A variety of evaluation methods were used to determine the knowledge and skill level of program participants. These included pre-and post-test and self-reporting by participants.

- b. **Impacts**-- Multi- County Agents had more than 164,000 contacts with food stamp participants in FY 2005. They taught 116 food safety lessons on such topics as: food contamination, bacterial illnesses, personal cleanliness, kitchen cleanliness, sanitation in food preparation and storage, eating safely when eating out, and safety in the kitchen. Food preparation demonstrations, small group discussions, grocery store tours, newsletters, displays, video presentations, role playing, and nutrition-based games and puzzles were some of the methods used to deliver the program. Staff had a combined total of 817 contacts in teaching food safety. Seventy-one percent of the target audience through a post-food safety test reported that they practice washing hands in hot soapy water for at least 20 seconds before handling food as opposed to 24% who reported washing hands with hot soapy water for at least 20 seconds prior to lessons presented by the agents. Sixty-two percent used proper measures to prevent cross-contamination in the purchase and storage of food and meal preparation.

The comments below are typical of those received from program participants.

I no longer smoke while preparing food.

Ashley County

I encourage my family members to practice good personal hygiene and sanitation.

Jefferson County

I wash my hands thoroughly after touching eggs, raw meat, fish, or poultry.

Woodruff County

I now know that bacteria grow quickly on dirty dishes and in spills. I wash dirty dishes and clean up spills before going on to the next task.

St. Francis County

I consider the cleanliness of the food outlet before I make a purchase.

Drew County

c. Source of Impact – Eastern Arkansas

a. Funding

CSREES - \$13,526
State -\$13,501
Other - \$45,496
Total \$75,522

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GOAL 2: 1890 Extension Program 4 – Hazard Analysis and Critical Control Point (HACCP) Training and Education

Key Theme: HACCP, Foodborne Pathogen Protection

Focus Areas: HACCP Workshop

- a. Brief description of activities** – Two HACCP Roundtable Meetings (January 12 and March 8, 2005) were held at the University of Arkansas at Pine Bluff with grant support from USDA/Food Safety and Inspection Service (FSIS). Nine meat and poultry processors from Central and Southern Arkansas attended this discussion forum to discuss HACCP, food safety issues, and updated regulations with FSIS officers from the Springdale, AR District Office.

The Department of Agriculture at UAPB continues to serve as the State HACCP Contact and Coordinator for technical advice, assistance, resources and to conduct activities in support of HACCP implementation in small and very small plants. These Roundtable meetings helped UAPB become a food safety and HACCP resource in Arkansas

- b. Impact** – Processors utilized the discussion forums to get answers to their concerns and needs in HACCP, food safety, and to learn about new regulations from FSIS officers and invited speakers. The long-term impact will be improved quality and safety of foods handled through small and very small processing plants in Arkansas.
- c. Scope of Impact** – Region
- d. Funding -**
- | | |
|----------|-----------|
| CSREES - | \$71,661 |
| State - | \$54,002 |
| Total - | \$125,663 |

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GOAL 3: A Healthy Well-Nourished Population, Research program 6 – Herbs and Vegetable Production

Key Theme: Human Health, Medicinal Plants, and Nutraceuticals

Focus Areas: Modifying food intake behavior and sustainability of agriculture and forestry

- a. Brief description of activities** -- Nutritional intervention through introducing specialty vegetables and herbs in the diets for better health was the goal of this project. Research was designed to identify suitable varieties of bitter melon, bottle gourd, and hot pepper. Experiments were conducted to evaluate selected varieties for their production potential, nutritional qualities, and acceptability of the vegetables as cooked foods. Four varieties of bitter melon were analyzed for protein qualities and functional properties. The phytochemical analyses were conducted at the Food Science Department of the University of Arkansas, Fayetteville. Two varieties of bitter melon and two of bottle gourd were used in cooking and taste testing experiments for developing suitable recipes for consumers' acceptance. Three recipes were re-evaluated for cooked bitter melons and bottle gourds. Samples from the campus population were used in the taste-testing of the cooked vegetables. In another experiment, selection for promising hot pepper lines for productivity and ornamental qualities were repeated from last year.
- b. Impacts** -- Two bottle gourd varieties and three bitter melon varieties were selected for on-farm trial and demonstration. Agronomical studies on cultural practices such as spacing, fertilization, water management, insect management will be conducted simultaneously along with on-farm demonstration.

In proteins and Phenolic compound analyses, white varieties of bitter melon had relatively higher total proteins and Phenolic contents in the edible parts than the green varieties, indicating that bitterness may not be associated with the color pigments. Some varieties of hot pepper may be available for on-farm trials and demonstration next year.

Bottle-gourd-chickpea soup and bitter-melon-beef stew were liked by 90% of the samplers again this year. A bottle salad was highly liked by the samplers. One or two plants of bottle gourd can provide enough vegetable for a family of home gardeners. A recipe demonstration and food intake nutritional study using bitter melon and bottle gourd is being planned. More recipes using spices of known medicinal qualities need to be included in the recipe studies.

Bitter melon, bottle gourd, hot pepper, and improved varieties of southern pea may provide additional alternative crops for the small farmers and home-gardeners to make additional cash benefits. Moreover, these special vegetables may increase health benefits for many of the target consumers.

- c. Scope of Impact** -- Arkansas and the Southeastern United States

d. Funding CSREES \$105,174
State - \$54,427
Total \$159,601

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GOAL 3: A Healthy Well-Nourished Population, Research Program 7 – Health Benefits of Probiotic Bacteria

Key Theme – Human Health

Focus Area – Modifying food intake behavior, scientific basis of optimal health

a. Brief description of activities – Results from the 2004 feeding study were presented at the 1890 Research Directors and Extension Administrators Conference in 2005. The paper was awarded second place in the competitive paper session for nutrition and health. During the spring of 2005, a 24 question instrument was developed by the research team of a nutritionist and an agricultural educator at the University of Arkansas at Pine Bluff. The questions dealt with yogurt consumption and other dairy products, reasons why households purchase yogurt, factors that influence selection of yogurt in the grocery stores and demographic information. Surveys were distributed and responses collected. Results of the questionnaire-surveys are presented in this report. Presence of probiotics was the second most important factor in the selection of yogurt among parents whose children were fed yogurt; in the 2004 feeding study's price was chosen as the most important factor. Therefore, future work will focus on educating parents and children about the advantages of yogurt containing probiotics. Results of the consumption survey were highlighted at the 50th Rural Life Conference in 2006 at UAPB and will also be presented at the 2006 ARD Research Symposium in Atlanta.

a. Impacts – This research results in the increased consumption of yogurt among children and the increased awareness of the importance of the presence of probiotics in yogurt among parents of the children who participated in the study in Pine Bluff, Arkansas:

- Exposure of children to yogurt during the feeding study resulted in a 63.7% increase (63.7% compared with 37%) of the number of children consuming at least one serving of yogurt per day and a tremendous increase (36.4% as compared with 7.4%) of children consuming 2 servings of yogurt per day.
- Parents of the students who participated in the feeding study became more aware of the benefits of yogurts containing probiotics: 27.3% of these parents as compared to 3.7% considered the presence of probiotics as an important factor in their selection of yogurt in the grocery store.

b. Scope of Impact – Southeast Arkansas Region

c. Funding – CSREES \$114,256
State - \$29,049
Total - \$143,305

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GOAL 3: A Healthy Well-Nourished Population, 1890 Extension Program 5 -- Families First-Nutrition Education and Wellness System (FF-NEWS)-Diet and Health

Key Theme: Human Nutrition and Human Health

Focus Area: Modifying food intake behavior

- a. Brief description of activities** – The FF-NEWS Program is a multi-state partnership involving a consortium of 1890 institutions. Arkansas’ program is designed to help food stamp recipients in 8 counties and other low-income families select and prepare meals consistent with their cultural traditions while improving their family’s overall health. Coalitions are formed in each county representing a cross section of impacted clientele and communities to provide program input.

FF-NEWS Multi- County Agents and 1862 Family and Consumer Science Agents in the 8-county area delivered the program. Food demonstrations that incorporated the concepts of healthy eating as set forth by nutrition standards and guidelines were conducted for participants to observe and sample the finished products. Nutrition related exhibits and displays along with accompanying handout materials, and interactive activities were part of the FF-NEWS educational presentations.

- b. Impact(s)** – Nutrition education resulted in 164,356 total contacts with program participants. Multi-county agents and 1862 staff conducted 1, 834 educational sessions on diet and health with 5,139 program participant contacts. Five hundred fifty-five (555) requests were made by program participants for additional information on concerns regarding dietary quality. As a result of this program, 3, 404 program participants indicated the following changes to their diet/lifestyle.

- 38% increased knowledge of resources to use for making healthful food choices
- 52% selected healthy food choices when eating out
- 49% reduced food portion sizes
- 49% increased more fruits and vegetables in the diet
- 35% increased physical activity
- 52 % selected foods low in salt and fat
- 77% practiced washing hands according to recommended procedures
- 52 % buy fruits and vegetables when in season

A few of the program participant comments concerning the benefit of the FF-NEWS Program are included below:

The food demonstrations at the site where I get my commodities are a great help to me. I did not know how to use many of the products.

Jefferson County

I am walking more as a result of this program.

Drew County

My family is eating more fruits and vegetables because of the food demonstrations I have been a part of.

St. Francis County

Eating smaller portions and walking more have helped me control my diabetes.
Ashley County

a. Scope of Impact: Arkansas

b. Funding CSREES - \$40,577
State - \$40,502
Other - \$136,489
Total - \$217,567

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GOAL 4: An Agriculture System Which Protects Natural Resources and the Environment, Research program 8 – Small Ruminant Nutrient Management

Key Themes: Sustainable Agriculture

Focus Areas: Small farms, animal nutrition and growth, sustainability of agriculture and forestry

- a. Brief description of activities** – In 2005, a free range styled browsing management system was used in evaluating browsing intensity, utilization and performance of mixed breeds and ages of goats. An over-grown pasture (two acres) of Arkansas native (Unseeded) grasses, shrubs and Forbes, was stocked with (1) mature and juvenile crossbred Boer goats (females and wethers) and (2) mature and juvenile crossbred Spanish-Nubian-Dwarf (Spanish-ND) goats (females and wethers). Total weight of dry forage (dry matter-DMO in the two acre pasture was estimated before the animals stocked. Twenty four animals (16 Crossbred Boer goats and 8 Spanish-ND goats) were stocked in the pasture for 80 days (August 31, 2005 to November 18, 2005). All animals received water and trace mineral salt ad-libitum. The animals were not given supplemental grain. The result showed that the goats consumed an estimated 80 percent of the total DM (3698.24 kg) in the pasture at an average consumption rate of 1.193 kg (2.62 lb.) DM per goat per day. Average percent body weight gain of the young Crossbred Boer goat for the 16th week of the trial was 14.95 percent compared with 9.09 percent for young Spanish-ND goats. The mature crossbred Boer gained an average total minimal percent weight of 2.67 compared to -0.62 percent for the Spanish –ND goats.
- b. Impact** – Based on this study, an overgrown pasture can provide adequate energy and nutrients (without providing grain supplements) for both mature crossbred Boer Goats and crossbred Spanish goats. However, immature and young goats of either breed would require grain-concentrate supplements to grow to their maximum potential. Information collected from this study will enable farmers: (1) to know that a well grown pasture can be the sole source of nutrients for mature goats of either crossbred Boer or crossbred Spanish goats; (2) understand that young goats would require grain supplements to grow faster and larger. By adopting this information, a farmer could save as much as three 50 pound bags of grain or \$18.00 over a 16 week feeding period per goat. The farmer's savings from feed could be substantial depending on the size of the herd.
- c. Scope of the Impact** – State and Regional
- d. Funding**
- | | |
|----------|-----------|
| CSREES - | \$132,114 |
| State - | \$68,368 |
| Total - | \$200,482 |

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GOAL 4: An Agriculture System Which Protects Natural Resources and the Environment, Integrated 1890 Research and Extension Program 4 – Water Quality Monitoring of Swine Waste Treatment System and Constructed Wetland.

Key Themes: Nutrient Management, Water Quality

Focus Areas: Natural resources and environment

- a. Brief description of activities** – The project activities accomplished during the past year include: 1) completion of project design and construction of the swine waste treatment lagoon, pasture sprinkling system, connecting pipe work and gate valves, a three-cell constructed wetland, pump z-pipe connection site for heavy use areas and road improvement along the wetland levee leading to one of the heavy use areas, 2) one wetland cell was planted with cannas spp., and 3) a canna seed germination project was conducted to investigate germination methods that may be applied to large numbers of canna seeds.

Publication:

Buckner, E. R. and L. Hairston. Evaluation of Various Methods of Canna Lily Seed Preparation. Journal of Arkansas Agriculture and Rural Development, Vol. 6 (In Press)

Hamilton, D. and E. R. Buckner. Waste Stabilization Pond, Ambient Temperature Anaerobic Bioreactor ... No Matter What You Call It, It's Still a Lagoon. Southern Animal Manure and Waste Management Quarterly. October 2005

Impact –This project will demonstrate the environmental effectiveness of separating swine solid and liquid waste before anaerobic lagoon treatment, and using constructed wetlands for additional effluent treatment before application onto pastures (Arkansas Pollution Control and Ecology Regulation 5). The level of effectiveness will be evaluated in comparison to currently accepted methods of swine waste treatments for small swine operations. Economic assessments to be conducted in the future will focus on the reduced municipal cost of cleaning up non-point source pollution in surface water.

Regarding plant producer impacts, we investigated germination techniques for large numbers of canna seeds and found that acid scarification was more effective than physical scarification when preparing large numbers of cannas for germination

Scope of Impact – Local and Regional

b. Funding CSREES Research - \$16,285
State Research - \$8,427
Total - \$24,712

CSREES Extension - \$79,915
State Extension \$54,002
Total \$133,917

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GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, Research program 9 – Socioeconomic Impact of Agricultural Policy on Minority and Limited-Resource Farmers

Key Themes: Agricultural Systems

Focus Areas: Sustainable agriculture, farm financial management, sustainable development

- a. **Brief description of activities** – This research will focus on determining the reasons why there is such a difference in the amount of payments received between economic groups of farmers. Surveys of farmers, and economic modeling and analysis will be conducted. The findings of this research will be used to suggest more viable policy options for limited-resource farmers thus enhancing the socioeconomic status of limited-resource farmers.

The research scientist resigned and the work was reassigned for this project late in the year. This scientist spent time in review of the literature and preparation of the program proposal.

- b. **Impact(s)** – The intent of this research is to help create agriculture policy that is more responsive to the needs and situation of small and limited resource farmers. The target audience for this benefit will be the policy makers involved in agriculture policy. These benefits will result from increased awareness and beneficial changes in agriculture policy.
- c. **Scope of Impact** – Small-Limited-Resource Farmers of the Mid-South, Small-Limited Resource Farmers of Arkansas and Small-Limited Resource Farmers of America.
- d. **Funding** **-0-**

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GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, Research program 10 -- Improving quality of life

Key Themes

Focus Area

- a. Brief description of activities** – This project was terminated. The faculty member assigned to this project resigned June 30, 2004 and the position has not been filled.

GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, Research program 11 – Predictors of Quality Childcare Programs

Key Theme: Childcare/Dependent Care, Early Childhood Education

Focus Area: Improvements in the quality of early childcare/home daycare center programs in southeast Arkansas

- a. Brief description of activities** – The faculty person assigned to this project died and the new faculty person hired had only 3 months with the project. The survey has been developed, pre-tested and the faculty assigned is getting the proposal approved. The project will draw comparisons with regard to education, training and salaries utilizing the quality rating score from the Early Childhood Environment Rating Scaled-Revised (ECERS-R) and the Infant/Toddler Environment Rating Scale (FDCERS).
- b. Impacts** – Improved quality of early childhood programs, including Head Start Centers and family day care homes in Southeast Arkansas
- c. Scope of Impact** – Regional/Southeast Arkansas
- d. Funding** – CSREES -0-
State \$22,677
Total \$22,677

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**GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, 1890
Extension Program 6 – Family and youth programs**

Key Theme: Children, Youth and Families at Risk

Focus Area: Decision making, enhancing skills

- a. Brief description of activity** – Three 1890 Extension priority programs were conducted within Goal 5. They are (1) The Young Scholars Program (2) *Teens On The Go Newsletters* and (3) The Early Childhood Care and Education Program.

1. The Young Scholars Program

a. Brief description of activities -- Seventy-seven children, referred to as *Young Scholars* and their parents are enrolled in the program. The children meet five days a week in a year long after-school program that is conducted in the housing project where they live. The children are taught math and science skills using agriculture and human sciences subject matter. They are engaged in learning activities that strengthen character, develop conscience, build social and problem solving skills, enhance the development of high self-esteem, and teach civility, respect, citizenship, individual and social responsibility and how to resolve conflict. Once the children reach age 16 they remain in the program and serve as mentors for the younger children.

Parents enrolled in the program serve as volunteers for the after-school program and participate in weekly group meetings. The educational components for the parents includes the curriculum for the children as well as information on parenting education, job related skills, stress management and coping skills, family relationships and economic and self-sufficiency skills.

The Young Scholars Program is designed to reverse the poor academic trend of low-income minority youth and help them succeed in school. In its tenth year, the program is implemented in two counties in the Delta Region of the state, Monroe and Lee. The program targets low-income, minority children, ages 6-15 and their parents who live in public housing. The program promotes male responsibility and teams boys with their fathers/grandfathers and other male role models.

b. Impact(s) – Program staff see much evidence of the success of the Young Scholars program. The children are respectful and well behaved. They have improved school performance in math and science and an increased sense of self-worth. Staff report that the children use appropriate means of resolving conflict. The majority of parents are employed and report increased knowledge in stretching the family' income, reducing and controlling debt, and saving money.

2. Teens On The Go Newsletters

a. Brief description of activities – This newsletter series has been written by the 1890 family and child development specialist for nearly 30 years. It is designed to help students in grades 7-12 make appropriate decisions regarding such issues as substance abuse, teen pregnancy and sexually transmitted diseases. Each issue addresses a single topic. The newsletter is offered bi-monthly and distributed through schools. The 6 issues of *Teens on the Go* distributed in 2005 included:

- Facing Up to Loss
- Stress and What You Can do about it
- In Your Face: the Impact of Violence
- Teen Suicide: When the Blues Get Out of Control
- HIV: What Are the Risks?
- Heroin: A Deadly Narcotic

b. Impact(s) In FY 2005, *Teens On the Go* newsletters were distributed to students in 30 Arkansas counties and distributed to 68,956 students.

Teens had this to say about the FY 2004-2005 issues of Teens on the Go.

Teens on the Go contain facts and helped me to understand what is going on in life. I think all teens should read this newsletter.

Teens on the Go are so informative and interesting to read. They help you to make wise decisions about issues you face. The issue on Facing up to Loss came at a good time in my life.

The newsletters are well organized and written and in a form that is easy to understand. I have learned to think things over completely before acting. I am making better decision because of Teens on the Go.

Some subjects are hard to discuss. It is good to have Teens on the Go to provide this private information to us.

1. Child Care Dependent Care

a. Brief description of activities -- A number of years ago the Early Care and Childhood Education Program at Arkansas State University and the 1890 Family and Child Development Program formed a partnership to meet the state's need for quality programs for young children through providing high-quality in-service training for early childhood education professionals. The 1890 family and child development specialist provides training at the district and state levels. The focus of the 1890 program includes: understanding stages of child development and learning, strategies for working with groups of young children, importance of and achieving small group size, developmentally appropriate activities for young children, a child-centered program, using a positive guidance approach, parental involvement, and initiating a parent-focused program.

c. Impacts --- In the 1890 program the educational services to children promote their cognitive development, while activities for parents both support their parenting role and encourage the parent's own development and learning. As parents pursue their own educational and employment opportunities, they can increase the family's income, over time reducing the direct impact of poverty on the child. This three-prong approach (promoting child development, enhancing parenting skills, and providing adult economic and self-sufficiency services) is a promising intervention strategy for helping families overcome some of the challenges they face.

- d. **Scope of Impact** – Arkansas
- e. **Funding** CSREES - \$262,747
State - \$108,005
Total - \$370,752

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**GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, 1890
Extension Program 7 --- Agriculture awareness**

Key Theme: Youth Development

Focus Area: Agricultural awareness

- a. Brief description of activities** – Arkansas AG Adventures developed as a result of Producer Focus Groups that identified a significant need for increasing factual public information and education regarding production agriculture with children and young people. A center to teach youth about agriculture was established on the University of Arkansas at Pine Bluff’s Research and Demonstration Farm in Lonoke, Arkansas. Children learn a variety of subjects through hands-on lessons at the center. The program also provides in-school visits for those schools limited in bringing students to the center due to travel and costs. Eleven programs were held at the agricultural awareness center. Eighty seven outreach programs were held throughout the state. Fifty students participated in an Agricultural Awareness workshop conducted during the Forestry and Wildlife Camp and 1200 students participated in a Pizza Ranch program.
- b. Impacts** – The GPS Nature Mapping Program, has generated a tremendous amount of interest and excitement among students and teachers. One example of the success of this program is with the teachers at Goza Middle School in Arkadelphia, Arkansas. The science teachers attended the 4-H Technology Club training in May and have now convinced the school to purchase 10 GPS receivers for their classrooms. Three of the teachers are becoming volunteer leaders and will be starting in-school 4-H clubs, as well as a traditional 4-H club in Arkadelphia. They have requested that the GPS and Nature Mapping program be presented to their classes again this Fall.

The sixth grade classes at Goza Middle School have 151 students. At the end of the third day of programming, the students were given a post-assessment. Results of the post-assessment include:

- 87% used GPS for the first time during this program.
- 73% felt they learned enough about GPS during this program to use it on their own.
- 81% plan to use GPS again in the future.
- 76% exhibited an increased knowledge of careers that use GPS
- 59% would consider a career using GPS technology.

Additional outreach as a result of teachers purchasing the GPS receivers include the teachers setting up school enrichment dates. The program teaching Global Positioning Systems and the related hands-on experiences was replicated with students in the 4th through 7th grades at the Community Family Enrichment Center in Arkadelphia and at a Camp Wilderness Day camp held during the summer. A total of 173 youth have been reached via this GPS program. All total, 650 individuals participated in field trips to the Agricultural Awareness Center and over 2,000 students attended school-based programs.

- c. Scope of Impact** – Regionally
- d. Funding** State - \$67,395

Total - \$67,395

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GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, 1890 Extension Program 8 --- Extension Youth Livestock Program

Key Theme: Youth Development / 4-H

Focus Area: Personal responsibility

- a. Brief description of activities** – Youth (4-H and FFA) livestock projects are very popular in Arkansas encompassing all species of domestic livestock. Thirty participants were involved in the Southeast District 4-H Horse Show, 255 participants from eleven counties participated in livestock activities at the Southeast District Fair, and 1316 participants from fifty-five counties participated in the swine activities at the State Fair. Six 4-H record books were submitted at the state level in Swine and Veterinary Science and additional participants were involved in the Veterinary Science talks presented at the 4-H O’Rama.

- b. Impacts** – These events provide opportunities for youth to learn and exhibit personal responsibility, sportsmanship and how to function and cooperate in group activities. They also offer a chance for young people to develop a respect and appreciation for animals and expose them to career opportunities in animal science. Several County Extension Agents and FFA instructors in Arkansas resulted from their experiences and participation in livestock related youth activities.

- c. Scope of Impact** – State of Arkansas

- d. Funding** - CSREES - \$33,386
State - \$13,501
Total - \$46,887

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GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, 1890 Extension Program 9 --- Small Farm Management

Key Theme: Agricultural Financial Management

Focus Area: Agriculture profitability

Description of Program 9 – To provide educational programs and training. The Small Farm Management program enrolled agricultural producers in the in the following areas 1) Loan education and training 2) Land improvement education 3) Soil fertility 4) Improved production practices 5) Improved infrastructure for vegetable cooperatives and 6) Increased marketing opportunities

a. Brief description of activities –

1) Loan education and training -- To annually provide 100 Socially disadvantaged farmers (SDFs) with training and education on loan packaging including education on financial statements, ratios, cash flow analysis, repayment ability, and breakeven analysis. To address this problem funds from a risk management and 2501 grants were used to place extension associates in four counties in the Delta and two counties in Southwest Arkansas. The extension associates provide one-on-one and group assistance to SDFs and limited resource farmers (LRFs) with loan applications. This includes providing farmers with assistance in understanding the USDA loan application process and providing education on financial planning. Educational meetings on crop insurance, Farm Service Agency (FSA) Loans, alternative crops, Forestry Management, were also conducted. Agricultural producers participated in the programs, representatives from the United States Department of Agriculture (USDA) and State Agencies participated in the meetings.

b. Impacts -- In 2005 the small farm staff provide assistant to 92 individuals with an interest in attaining loans. Of the 92 individuals that were assisted or provided information on loans, 33 received approximately 3.2 millions dollars in loan funds.

a. Brief description of activities

2) Land improvement education -- To help 25 SDFs improve their land by providing information on USDA Programs that provide cost share assistance (50-75%) on practices such as irrigation, land leveling, and installation of underground pipelines. To help address this problem the staff in four Delta Counties was trained by the Natural Resource Conservation Service (NRCS) on the Environmental Quality Incentive Program (EQIP) and other Conservation Programs. However, the EQIP Program is the major program used to help farmers apply conservation practices to improve their land. The staff then informed SDFs and LRFs about cost-share opportunities available to assist farmers in installing land improvements. The staff also provided EQIP information directly to 130 SDFs and encouraged all farmers to have a NRCS representative to visit their farm and develop a conservation plan which would identify eligible cost share conservation practices for the farm.

b. Impacts -- as a result of providing information on the EQIP Program 34 SDFs were accepted into the program and were approved to receive approximately \$366,000 in cost share funds to put conservation practices on their farms. These SDFs will have to provide their cost share amount which could be from 50 to 15 percent of the cost of the practices. Also in some situations soil structure will have to be re-built and organic matter increased. When the land is improved the value of the land could increase by a minimum of \$300 per acre. In addition, the land will be much easier to work (require less labor), and yields will increase significantly.

a. Brief description of activities

3) Soil fertility program-- To assist 25 SDFs in improving their land by adding lime when needed and when possible using a USDA Loan to apply lime. This goal was not accomplished due to the higher input costs anticipated from increase in fuel and fertilizer prices that exceeded 25 percent. Any income for lime had to be used to cover the increase in inputs and the anticipated fungicide cost (\$30 per acre) to control Asian Soybean Rust.

a. Brief description of activities

4) Improved production practices-- To provide cooperative extension service crop production recommendation to 250 SDFs in an effort to help improve farm yield.

Staff placed in six counties to assist farmers with production and to encourage SDFs to use extension recommendations and attend extension production meetings. The small farm staff provides row crop farmers in the Delta with on-farm visits, extension publications such as the weed control manual, the insect control manual, the soybean variety recommendations, wheat variety recommendations, etc. The staff also provides a soil probe to assist in soil testing along with weed control recommendations, and updates on the Asian Soybean Rust. In Southwest Arkansas the staff had the UAPB livestock and vegetable specialists to make on-farm visits to several farmers to provide recommendations.

b. Impacts -- We estimate that approximately 5000 acres were planted using extension recommendation increasing yields by approximately 5-10 bushels per acre. Hopefully more SDFs will start calling or using extension agents for production assistance and that socially disadvantaged farmers will starting attending extension educational meetings on a regular bases.

a. Brief description of activities

5) Improved infrastructure of vegetable cooperatives -- To help three vegetables cooperatives build infrastructure by assisting the cooperatives in developing proposals to obtain grading equipment and coolers. This objective was not completed due to a shortage of staff to accomplish the goal.

a. Brief description of activities

6) Increased marketing opportunities -- To provide production assistance with alternatives to ensure that SDFs produce maximum yields and to assist SDFs in identifying alternative crops markets. The small farm staff encourages farmers to consider adding high cash value vegetable crops to their row crop operations to increase income. Approximately 3 percent of SDFs grow vegetables, therefore the small farm staff in all six Delta counties attempted to identify vegetable producers and potential vegetable producers in their area. Some of the staff also met with representative from the Marriot Hotel, Wal-Mart, and Alcorn State University to get information on marketing and potential markets.

The small farm staff provided vegetable producers and potential producers with information on productions that includes fact sheets from UAPB and the Extension service. Financial information such as projected income, expenses, and net return per acre is provided. Information on the Marriot Hotel marketing efforts with Black Farmers was presented to several farm cooperatives as well as information on Wal-Marts plans to buy local and from minority vendors. This information was also published in the projects “Farm Sense” newsletter and sent to all 450 SDFs on the Small Farm Mailing List.

b. Impacts -- Several farmers planted the new southern pea variety “Top Cross” as a result of the information provided by the staff and from information gathered on a vegetable tour sponsored by the staff. Also after being notified by the staff, squash producers are now using squash varieties that are resistance to the Cucumber Mosaic Virus that was destroying their late squash. Several farmers are also marketing some of their vegetable with Wal-mart and one load of southern peas were marketed through Alcorn State University in Mississippi, however, no farmers marketed vegetables with the Marriot hotel chain during FY 2005.

- c. **Scope of Impact** – State of Arkansas
- d. **Funding** - State \$ 44, 475
Other – Federal \$306,606
Total - \$351,081

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GOAL 5: Enhanced Economic Opportunity and Quality of Life for Americans, Integrated 1890 Research and Extension Program 5 – Recreational fishing in the Delta

Key Themes: Agriculture and Natural Resources

Focus Area: Natural Resource Management, Other recreation and youth development

- a. **Brief description of activities** -- Specific research and extension needs identified from stakeholder input included: 1) enhancing largemouth bass recreational fishery in Arkansas River; 2) improving growth and survival rates of hybrid striped bass fry and fingerlings; and 3) improving recreational fishing in farm ponds and in community fishing ponds.

The following projects were developed and implemented to respond to the identified needs:

Enhancing Largemouth Bass Recreational Fishing

1. Improving Growth and Survival Rates of Hybrid Striped Bass Fry and Fingerlings
2. Improving Recreational Fishing in Farm Ponds and in Community Fishing Ponds
3. Youth Fishing Education

Each of these will be included separately in this section.

1. Enhancing Largemouth Bass Recreational Fishery in the Arkansas River

a. **Brief description of activities** -- Studies were done to assess the stocks of largemouth bass populations in the Arkansas River and to evaluate the stockings of hatchery-reared fingerlings intended to improve largemouth bass populations in the River. Immediate results include basic stock structure assessment of largemouth and spotted bass in all eleven Arkansas pools of the Arkansas River over two different sampling years.

The relative contribution of hatchery-reared fingerlings stocked at 2” and 4” were compared. Contributions to the year class were similar despite stocking 5 times as many 2” fingerlings as 4” fingerlings. The economics of stocking different sizes of fingerlings were compared to their relative contributions to the year class. Economics favored stocking 2” fingerlings. We learned that stocking 309 fish/ha at 2” or stocking 62 fish/ha at 4” resulted in similar contributions to the year class. We also learned that growth rates of stocked fish did not differ significantly from growth rates of wild fish.

The results of this research were presented at several scientific meetings where the Chief and Assistant Chief of Fisheries for Arkansas Game and

Fish Commission were in attendance. We also had a special workshop in Heber Springs where we discussed these results with AGFC personnel and elicited opinions regarding future research to follow up on this work.

Additional dissemination of the information included 3 refereed journal articles, 8 published abstracts, 2 articles in trade publications and 11 presentations made at scientific meetings.

- b. Impacts** -- Based on these results, the Arkansas Game and Fish Commission is revising its stocking practices for fingerling largemouth bass. There is less emphasis on raising fish to 4". For example, fish from the Cummins State Prison brood stock ponds are being stocked at 2" rather than 4".

Stocking 2" fingerlings does appear to influence the composition of a year class of largemouth bass. Based on these results, Arkansas Game and Fish Commission is continuing with plans to stock largemouth bass fingerlings into pools of the Arkansas River in the future. This has the potential for improving recreational fishing in the delta.

Contact Information

1. Enhancing Largemouth Bass Recreational Fishery in Arkansas

River

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2. Improving Growth and Survival Rates of Hybrid Striped Bass Fry and Fingerlings

a. Brief description of activities -- We developed a technique for harvesting wild zooplankton using a rotating drum filter from outdoor culture ponds, concentrating the plankton, and intensively culturing hybrid striped bass in tanks using wild zooplankton as first feed. Rotifers, copepod nauplii, and small cladocerans survived the harvest and concentration process. Furthermore, a mix of wild zooplankton was able to absorb the HUFAs offered to them during the enrichment process. Enriched wild zooplankton is more likely to yield growth and survival rates comparable to those achieved using a monoculture of *B. plicatilis*.

We assessed survival and growth of hybrid striped bass larvae fed wild zooplankton as a first feed. Growth rates were lower than growth rates of hybrid striped bass fed *Brachionus plicatilis* enriched with Culture Selco®.

We assessed the relationship between egg size and size at hatch for hybrid striped bass. Egg size is not a good predictor of size at hatch, so selection of brood stock based on size of eggs produced by a female is unlikely to lead to larger larvae and better survival. We have assessed the relation between maternal influence and size at hatch.

Survival rates of hybrid striped bass larvae fed wild zooplankton were also somewhat lower than larvae fed *B. plicatilis*. We also assessed the feasibility of enriching wild zooplankton with HUFAs. We were able to double the lipid content and alter the lipid class and fatty acid composition of wild zooplankton with Super Selco®. Enriched wild zooplankton met the nutritional requirements recommended for hybrid striped bass juveniles. The ratios of omega-3 fatty acids were comparable to those of *B. plicatilis* and *Artemia nauplii* enriched with HUFAs.

In two separate experiments, we demonstrated a significant maternal influence on size at hatch and percent hatch. These influences were unrelated to differences in maternal nutrition or to egg quality differences. We also re-defined the relation between temperature and egg stage duration. We assessed the influence of egg stage duration on hatching rate and size at hatch.

We know there is a relatively strong maternal influence on hatching success and on size of larvae at hatch. We have learned that these two characteristics are not directly related to each other. We know that we have some control over size of larvae at hatch through incubation temperature, but that there are interactions between maternal influence and incubation temperature. While larvae from some females are longer when incubated at cooler temperatures, larvae from other females show the opposite response to incubation temperatures.

This information was presented through 3 refereed journal articles, 6 published abstracts and 3 presentations at scientific meetings.

- b. **Impacts** -- Kent Seatech, Inc., the world's largest hybrid striped bass producer, purchased a rotating drum filter, and began using it to harvest wild zooplankton from their recirculating grow-out systems based on the results of our research.

Contact Information

2. Improving Growth and Survival Rates of Hybrid Striped Bass Fry and Fingerlings

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3. Improving Recreational Fishing in Farm Ponds and in Community Fishing Ponds

- a. Brief description of activities --** The use of hybrid striped bass to control stunted prey populations in farm ponds was evaluated. Fish community changes were assessed following stocking with hybrid striped bass. Habitat requirements for hybrid striped bass in private ponds were also assessed.

The Arkansas Game and Fish Commission's Family and Community Fishing Program was evaluated to identify the effect of the frequency of stocking on angler satisfaction. An evaluation was conducted of the AGFC Fishing Derby Program to identify ways to increase effort at derby locations. The AGFC Hooked on Fishing, Not on Drugs (HOFNOD) program was evaluated.

Two workshops (Conflict Resolution and Water Quality) were organized and hosted for AGFC personnel. Additional training programs were conducted for high school students, county agents and clientele and new HOFNOD teachers training. A Farm Pond Management Website was developed.

- b. Impacts --** Awareness and motivations pertaining to pond management and recreational fishing were improved. Better handling, hauling, and stocking procedures were developed for hybrid striped bass.

The evaluation of the Family and Community Fishing Program provided a better understanding of angler motivations, attitudes, awareness, and expectations. Improved understanding of angler motivations and attitudes at derby locations was developed.

Teacher attitudes, skills, and motivations for program improvement were achieved.

AGFC employees from hatcheries, administration, and field stations learned skills to reduce conflict and improve communication and learned principles of water chemistry, water testing, and environmental management. Training was also received in new regulations from the Arkansas Department of Environmental Quality.

There were over 6,500 web hits on the web site, demonstrating improved access of pond information for county agents, AGFC biologists, and the general public.

Several articles were written and published in Arkansas Aquafarming, with about 1,800 contacts per article. These articles increase awareness and enhance learning on timely pond management issues.

More than 100 high school students attended an electrofishing workshop and learned the basics of electrofishing and developed an awareness of careers in fishery science. County agents and clientele in Cleburne, Stone, and Grant Counties learned basic and advanced principles in pond management and developed awareness of key pond problems and solutions. New and some continuing teachers enrolled as HOFNOD Program instructors attended a training program. The result was more informed instructors, better instructional tools, and an increased awareness of aquatic resource issues, and increased motivation.

The Farm Pond Management Website reduced contact time for county agents, increased use of Internet inquiries, and allowed for faster implementation of management activities.

Contact Information

3. Improving Recreational Fishing in Farm Ponds and in Community Fishing Ponds

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4. Youth Fishing Education

- a. **Brief description of activities** -- Two fishing activities were conducted for six 4-H O'Ramas in 2005, which included county, regional, and state O'Ramas. The Baitcasting and Fish ID Activity require students to demonstrate skills in casting and fish identification. The Reel into Sport Fishing Activity requires students to demonstrate knowledge in fish identification, fish habitat, fish tackle identification, and fishing knots. The youth fishing trailer created by UAPB for Extension Agents to teach aquatic and fishing education to area youth has fishing poles, tackle, and fish related activities that agents use to teach youth about fishing and aquatic education.

A total of 156 participants took place in all fishing activities. The Reel Into Sportfishing Activity was revised and used in 2005. The updated version is more educationally challenging to the students. A 4-H O'Rama and Fishing Education workshop was conducted on April 19, 2005.

A total of 1,364 youth and adults participated in 16 events that used the trailer from March to September 2005. The trailer was checked out for a total of 78 days. The survey given to agents checking out the trailer indicated that all agents thought the trailer was useful or very useful in teaching aquatic education to area youth.

- b. Impacts --** An evaluation survey of participants in the 4-H activities indicated that 96% of participating enjoyed the revised event, learning about tackle, knots, fish ID, and fish anatomy. In addition, 78% of participants also said they would participate in the revised activity again.

Ten agents participated in the 4-H and Fishing Education workshop. Participants learned skills required to prepare 4-H members to participate in the Baitcasting and Reel Into Sportfishing O'Ramas. The evaluation indicated that 100% of the participants indicated that the workshop provided them with everything needed to have a successful county fishing education program. All of the participants also indicated that they would participate in the program again.

Contact Information

4. Youth Fishing Education

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c. Scope of Impacts for programs 1 - 4 -- Arkansas

d. Funding for programs 1 - 4 –

CSREES	\$54,298
State	\$58,489
Other	\$14,942
Total	\$127,724

**Summary of Total Resource Allocations (CSREES/State/Other)
1890 Research and Extension Programs
University of Arkansas at Pine Bluff**

	2,005			TOTAL
	CSREES	State	Other	
GOAL 1 - An agriculture system that is highly competitive in the global economy				
Research Programs				
1. Crop protections systems	114,119	59,056		173,175
2. Alternative crop production	200,354	103,682		304,036
3. Minimally processed value-added products	16,285	48,220		64,505
4. Efficiency and profitability of hog farms	96,934	50,163		147,097
5. Engineering insect resistance in cowpea through gene transfer	98,860	51,160		150,020
Extension Programs				
1. Adoption of new best management Practices	58,781	202,785		261,566
2. Beef herd improvement	100,159	40,502		140,660
Integrated Research and Extension Programs				
1. Sustainable vegetable production				
Research	54,643	28,277		82,920
Extension	133,567	108,005		241,572
2. Catfish production and management				
Research	318,117	384,654	45,574	748,345
Extension	247,983	200,673		448,656

3. Baitfish Production and management				
Research	223,883	194,902	14,195	432,980
Extension	221,658	179,370		401,028
Goal 2 - A safe and secure food and fiber system				
Research Programs - NA				
Extension Programs				
3. Nutrition education and wellness system (Food safety)	13,526	13,501	45,496	72,522
4. HACCP training and education	71,661	54,002		125,663
Goal 3 - A healthy well-nourished population				
Research Programs				
6. Herbs and vegetable production	105,174	54,427		159,601
7. Health benefits of probiotic bacteria	114,256	29,049		143,305
Extension Program				
5. Nutrition education and wellness system (Diet and Health)	40,577	40,502	136,489	217,567
Integrated Research and Extension Programs - NA				
Goal 4. - An agricultural system which protects natural resources and the environment				
Research Program				
8. Small ruminant nutrition/management	132,114	68,368		200,482
Extension Program - NA				
Integrated Research and Extension Program				
4. Water quality monitoring				
Research	16,285	8,427		24,712
Extension	79,915	54,002		133,917

Goal 5 - Enhanced economic opportunity and quality of life for Americans

Research Programs				
9. Socioeconomic impact of agricultural policy on minority- and limited-resource farmers				
7. Recreational Fishing	54,298	58,484	14,942	127,724
11. Predictors of quality child care programs		22,677		22,677
Extension Programs				
6. Recreational fishing in the Delta	56,862	46,014		102,876
7. Family and youth programs *Young Scholars *Grandparents raising children *Parenting educating *Child care training	262,747	108,005		370,752
8. Agriculture awareness		67,395		67,395
9. Youth livestock programs	33,386	13,501		46,887
10. Small farm management		44,475	306,606	351,081
Integrated Research and Extension Programs - NA				
RESEARCH TOTAL	1,545,322	1,161,547	74,711	2,781,580
EXTENSION TOTAL	1,320,822	1,172,730	488,591	2,982,143