

**IMPLEMENTATION OF PLANS OF WORK (POW) 2000-2004  
UNDER THE AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION  
REFORM ACT OF 1998 (AREERA)**

**2003 ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS  
University of Arkansas at Pine Bluff**

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**IMPLEMENTATION OF 5-YEAR PLANS OF WORK (POW) 2000-2004  
UNDER THE AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION  
REFORM ACT OF 1998 (AREERA)**

**ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS**

**INTRODUCTION**

The 1890 Research and Extension programs at the University of Arkansas at Pine Bluff are associated with the School of Agriculture, Fisheries and Human Sciences. Research faculty in the Departments of Agriculture and Human Sciences are integrated in their academic units, while Extension personnel are under the direct supervision of Associate Extension Administrators. Faculty with split appointment are evaluated jointly by appropriate administrators with supervisory authority resting with the administrator responsible for the greater percentage FTE (academic, research or Extension). The number of faculty appointment with split appointments has been increasing.

The Department of Aquaculture/Fisheries and the Aquaculture/Fisheries Center of Excellence are administered by a Department Head who is also the Center Director. Under this structure, academic faculty are integrated into the functions of the Center of Excellence through joint appointments that include academic, research and/or Extension functions. The structural differences among the departments in the School of Agriculture, Aquaculture/Fisheries and Human Sciences requires concomitant differences in the structure of the institution's POW and in its annual reporting documents.

Research and Extension programs in Agriculture are conducted in the areas of plant science, horticulture, animal science, and agricultural economics. The efforts of the Department of Human Sciences are directed towards human nutrition, food safety, and family life. Consistent with the university's five-year POW, accomplishments in these areas are presented in Part I of the report - Agriculture, Family and Community Programs. Accomplishments in Aquaculture/Fisheries research and Extension are reported in Part II of this report.

All research and Extension programs at UAPB are designed and implemented to provide needed assistance and information to the state's Aquaculture industry, small-scale and limited-resource farmers, and disadvantaged families and youth. These programs have expanded greatly since their inception (research in 1967 and Extension in 1971). Greater responsiveness to clientele needs has resulted from CSREES formula funds and the AREERA mandated state matching protocol.

**Stakeholder input process**

A formal stakeholder input process was initiated this year for agriculture. Selected stakeholders with interest in each segment of the agriculture and Extension programs were invited to become members of a Stakeholder Advisory Committee. Committee members included producers, representatives of related industry and governmental organization and others with a vested interests in agriculture. Research and Extension personnel presented progress and activity

reports to the committee while administrators presented overviews and proposed directions of program for the future. Based on their experience, the committee was asked for input into shaping current and future agricultural programs (research and Extension). This process will become at least a yearly undertaking with committee members giving input on developing protocol.

In addition to the Advisory Committee, the 1890 Program has continued to require each program to develop its own stakeholder input mechanism depending upon the nature of the program and the targeted clients. The structure of the Extension Programs allows program activities in 18 counties with staff housed in 6 counties. Facilities for demonstrations and other program activities are located in three counties. Stakeholder input is gathered when applied research and demonstrations are exhibited at these sites for various clientele groups. Extension and research personnel attend producer meetings, professional meetings, workshops and focus groups as additional means of disseminating information and to obtain stakeholder input.

### **Merit review process**

Merit review is central to the university's goal of implementing quality programs that make a difference in the lives of people. Both research and Extension programs are monitored through the annual performance appraisal system to ensure adherence to this goal. Additionally, each department - Agriculture, Aquaculture/Fisheries, and Human Sciences - have historically conducted separate reviews of research proposals prior to their implementation. However, a new school-wide system for merit review was implemented in FY 2000. The system expands the current research peer review system to require a periodic external merit review process for all programs. A new component of the performance appraisal process (conducted annually) clarifies expectations for scientific productivity for research faculty.

Merit review in Extension includes inter- and intra-institutional assessments of program quality prior to the initiation of new programs and an annual review of program accomplishments during the annual performance appraisal process. Additionally, all programs are required to undergo an external merit review every three to four years either via a CSREES review or by external evaluators invited by university administration. Each department or unit head is required to facilitate the review process.

A review team of four research and Extension scientists from out-of-state universities conducted a peer review of the aquaculture/fisheries program in November of 1999. The Extension program in Family and Youth Development was reviewed by an external team in FY 2000. Both reviews were very positive and provided excellent input into program directions. The Agriculture and Human Sciences research programs and Extension agriculture programs have been approved for CSREES Review in FY 2004.

**OVERVIEW OF RESEARCH AND EXTENSION PROGRAMS REPORTED  
IN THE 5-YEAR PLAN OF WORK BY GPRA GOALS**

<b>Function</b>	<b>Goal 1</b>	<b>Goal 2</b>	<b>Goal 3</b>	<b>Goal 4</b>	<b>Goal 5</b>
1890 Research Programs	<ol style="list-style-type: none"> <li>1. Alternative crop production</li> <li>2. Crop protection system</li> <li>3. Catfish production and management</li> <li>4. Baitfish production and management</li> </ol>		<ol style="list-style-type: none"> <li>5. Vegetable and herb production</li> <li>6. Health benefits of probiotic bacteria</li> </ol>	<ol style="list-style-type: none"> <li>7. Integrated pest management</li> <li>8. Small ruminant nutrition/management</li> </ol>	<ol style="list-style-type: none"> <li>9. The economic status and behavior of minority farmers in Arkansas</li> <li>10. Improving quality of life</li> </ol>
1890 Extension Program	<ol style="list-style-type: none"> <li>1. Livestock management program</li> <li>2. Catfish production and management</li> <li>3. Baitfish production and management</li> </ol>	<ol style="list-style-type: none"> <li>4. Families first-nutrition education and wellness system</li> </ol>	<ol style="list-style-type: none"> <li>5. Families first-nutrition education and wellness system</li> </ol>		<ol style="list-style-type: none"> <li>6. Family and youth programs</li> <li>7. Recreational fishing in the Delta</li> </ol>
Integrated Research and Extension	<ol style="list-style-type: none"> <li>1. Sustainable vegetable production</li> </ol>				

**ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS – POW  
October 1, 2002 - September 30, 2003**

**Part 1 — AGRICULTURE, COMMUNITY AND FAMILY PROGRAMS**

**Goal 1 — An agriculture system that is highly competitive in the global economy**

**Executive Summary**

Two research, one Extension, and one integrated research and Extension program were executed under National Goal 1 in 2003. These programs addressed the competitiveness of small and limited-resource farmers in a global economy. Production methods and practices were investigated that have potential impact on management systems utilized by these farmers in the Arkansas Delta. The Extension programs were aimed at developing farmer skills that will help them manage traditional farming enterprises.

Research program 1 is an interdisciplinary research effort that combines plant breeding, crop production and economic feasibility studies to support alternative crop production. The plant breeding aspect of this project is limited to cowpea. However, production practices and economic evaluations are concentrated on cowpeas, sweet potatoes and leafy greens. Other crops will be added as the interest of farmers are evaluated. The goal of this project is to develop production systems adaptable to the farm environment of the small and limited-resource farmer. The economic impact of planting dates, seeding rate, and the use of agricultural chemicals on farm profits were also evaluated. Research program 2 investigated production practices and use of non-restricted insecticides for insect control with vegetable crops. Crops utilized in these studies are crops that many small and limited-resource farmers are currently processing (tomatoes and leafy greens).

Extension program 1 supports the management needs of small cattle and swine producers. Central to this program is the Bull Breeding Soundness Exam Clinics that evaluate breeding potential. Other activities include youth work (4-H and FFA) with livestock and veterinary science projects.

The integrated research and Extension program combines research and demonstration projects to supply answers to production and management problems facing small and limited-resource vegetable farmers in the Arkansas Delta. Farmer exposure to demonstration and developing research information was enhanced by utilizing three locations within the Delta.

## Goal 1 — Research Program 1 - Alternative Agriculture

### Key Themes: Agriculture Profitability, Plant Germplasm, Small Farm Viability

- a. Brief description of activities - The specific objectives of the study include the following:
  - 1) To conduct production agronomic studies on alternative crops for improved productivity under limited-resource situations.
  - 2) To conduct an economic feasibility study of alternative crops.
  - 3) Develop improved and appropriate alternative crop (southern-pea) varieties. Field plot studies that evaluate the effect of NPK fertilizer and herbicide use on southern pea yields are being conducted. Enterprise budgets are being developed that can be used to measure the increase profit potential of using herbicide for weed control in southern peas. Fall greens (Broad Leaf Mustard and Purple Top Turnips) are being grown under two planting methods (bed planting and non-bed planting) to determine the effect of planting method on yield. Sweet potato variety tests, in-row plant spacing studies and fertility studies are being conducted to determine practices best suited for limited-resource farmers. Twenty-five southern pea cultivars were evaluated for traits suitable for limited-resource farm production for two years at the Pine Bluff and Lonoke farm sites.
  
- 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 herbicides and consequently have poor weed control. Studies have determined that there is significant economic value in using herbicide - Treflan (Trifluralin) for weed control. Tests were conducted on two varieties of peas at the UAPB experimental farm in 1999-2003. Yields of peas (fresh pod) were increased from 6 to 33% (average increase 10%) from using Treflan herbicide for weed control. On a per acre basis yield increases ranged from 9 to 34 bu/A (average increase 12 bu/A). The level of response to herbicide use was also related to weed pressure in the test plots. Enterprise budgets developed for southern peas ((fresh market 1999-2003) indicated that average returns per acre were \$1,024.29 - Coronet variety and \$884.28-:A Quick-Pick variety. Total specified expenses were \$813.91. Anytime southern peas (coronet) can be sold for more than \$6.19/bu, a profit is being made. Anytime southern peas (quick-pick) can be sold for more than \$6.71/bu, a profit is being made.

Reducing in-row spacing from 12 inches to 10 inches and to 9 inches increased US#1 Grade sweet potato yields by 23% and 27% respectively. Total yield was not significantly affected by in-row spacing. The percent Jumbo Grade was reduced by lowering in-row spacing.

In the plant breeding efforts, twenty-five southern pea cultivars were evaluated in two years at the Pine Bluff and Lonoke Farm sites. Ten of the cultivars were advanced

selected lines while fifteen were released, or at near-release stages. The purpose of the

evaluation was to identify and select cultivars that possessed traits appropriate for use as parents in a cross-breeding and hybridization program. The cultivars were of two plant types, erect/brushy plants or of vinyl/spreading type. All evaluation trails were planted in late May to June in a Randomized Complete Block (RCB) design. Plots were four rows, 25 ft. long, with 2.5 feet between rows. Four replicates were used. The cultivars evaluated were selected on characteristics considered as acceptable for fresh pea production. These traits included fresh pea yield and adaptability potentials, purple or pink fresh pod color, pink or purple fresh pea eye color, plant type or morphology thought suitable for ease of manual or mechanical harvest, fresh pod length and fresh seed size.

Nineteen of the twenty-five southern pea varieties/cultivars evaluated in the breeding program were advanced to further evaluations. Of these nineteen varieties, five were selected for use in a cross-breeding and hybridization program. These nineteen cultivars were : Coronet, AR Black eye, LA Purple Hull (Quick Pick), Early Scarlet, California Pinkeye, TX Pinkeye, AR 91-285, AR 91-135, TX Improved Purple Hull, TX Improved Pinkeye, TX 56061, AR 91-245, AR 95-104, Purple Hull Big Boy, AR 95-105, Early Acre, TX 6-week Peas and Texas Big Boy. A hybridization program will be conducted in a greenhouse during the winter season.

- c. Impact - Consider, for example, farmers involved in the University of Arkansas at Pine Bluff 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. The economic benefit of growing Coronet only is approximately \$204,858 (200 acres @ \$1,024.29 = \$204,858). The economic benefit of growing LA Quick-Pick only is approximately \$176,856 (200 acres @ \$884.28 = \$176,856). The average benefit of using Treflan was \$168/A (12 bu/A @ \$14/bu = \$168/A). Total benefit would be \$33,600 (\$168/A @ 200 acres = \$33,600).

The response of Fall greens (broadleaf mustard and purple top turnips) to bed vs nonbed planting has been inconsistent. Other small farms in the Lower Mississippi Delta Region should be able to reap similar per acre benefits from the use of the herbicide, Treflan. In summary a farmer growing 200 acres of southern pea could increase its profit margin in excess of \$200,000 by growing tested varieties of peas and using the herbicide, Treflan. This information will be disseminated to farmers via pamphlets and newsletters. The target audience will include: Small Limited-Resource Farmers of the Mid-South, Small Limited-Resource Farmers of AR and Small Limited-Resource Farmers of America.

- d. Scope of Impact - Eastern Arkansas
- e. CSREES Funding – **\$174,326**

State Matching - **\$55,948**  
Other Funding –

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## Goal 1 – Research Program 2 - Crop Protection System

### Key Theme: Other - Pest Management

- a. Brief description of activities - Research activities in 2003 included an evaluation of thrips vector control using insecticides to augment tomato spotted wilt virus (TSWV) resistance in newly released tomato varieties. TSWV was present in the plots and disease free yields from resistant and non-resistant varieties were compared.

The impact of staking tomatoes was assessed following an inquiry by a vegetable grower. Different types of tomatoes (roma, bush, yellow and fresh market) were grown without staking to determine yield loss when compared to staked tomatoes. Plots of greens with large numbers of green stink but (GSB) were sprayed with alternative insecticides, Neem oils and safer soap, to determine efficacy.

- b. Impacts (s) – There were no differences in the level of TSWV symptoms in the fruit yield between the sprayed and not sprayed plots for each variety. Until more research shows that resistance can be enhanced by controlling thrips vectors, treating tomatoes with insecticides would not be recommended to lessen the impact of TSWV. In addition, there appears to be substantial differences in TSWV resistance between varieties. TSWV was observed in the plots, 2 susceptible varieties had 48% and 2 varieties listed as resistant had 63% of the fruit infected. The resistant variety of BHN 640 had 30% of the tomatoes infected. Resistant varieties offer some protection from the TSWV but the losses due to the TSWV varies considerably. Depending on the geographical location and strain of the virus resistant varieties may not yield more symptom free fruit than standard varieties. Selection of a resistant variety should be carefully made and, if possible, based on tests from the local area.

The non-staked tomatoes yielded only 30-40% of the yield when compared to staked tomatoes. The loss was consistent for most types of tomato varieties. There was no increase in insect activity associated with the non-staked growing conditions. Attempting to reduce tomato production costs by no staking and roping the plants should be carefully weighed against potential yield benefits. Because non-staked tomatoes yielded only 35% of the yield of staked tomatoes, the same yield from non-staked plants can be harvested from one-third the number of staked plants.

The insecticide treatments did not reduce the numbers of GSB more than the non-treated controls. Although sevin is recommended for GSB control, no reduction in numbers over the control plots were noted. In addition, the alternative insecticide Neem and Safer Soap was no better than either sevin or the non-treated control.

- c. Scope of Impact – Fresh market tomato and greens producers in Southeast Arkansas.

- d. CSREES Funding – **\$102,040**
- State Matching – **\$32,749**
- Other Funding –

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## **Goal 1 – Extension Program 1 - Livestock Management Program**

### **Key Theme: Agricultural Competitiveness**

- a. Brief description of activities – The major activities associated with beef cattle in the Livestock Management Program involves Bull Breeding Soundness Exam Clinics (BSE Clinics), Cow Herd Performance Test work with several herds and general cattle management practices. Bull BSE Clinics are conducted in several counties in conjunction with a local county Extension agent and a local veterinarian to evaluate bulls for their breeding potential in the herd. Performance testing has been carried out on several farms with the growth records on the calves being used to direct the herd breeding program. Various herd management practices have been discussed at county cattle production meetings and with individual producers when visiting their farms.

There has been an 83% reduction in the number of swine producers in the state of Arkansas over the past ten to fifteen years with a moderate increase in the total hog inventory. Commercial swine production is about 98 to 99% contract operations with the remainder being independent producers. Youth swine shows (county fairs, district fairs and the state fair) are very popular. Most of the swine work involves work with youth at the fairs.

Other livestock work involves youth (4-H and FFA) and livestock projects such as the 4-H Veterinary Science Project, District and State livestock shows and District and State 4-H Horse Shows.

- b. Impact(s) – Thirty-five bulls were tested in three BSE Clinics in FY'03. About 15% of these (6) were found to be unsatisfactory for breeding purposes. The actual cost of replacing these bulls would range from \$6,000 to \$12,000. However, the value of identifying these bulls and replacing them before a calf crop is missed or delayed exceeds \$100,000. Cattle producers are beginning to recognize the importance of testing bulls for soundness and using this knowledge to increase herd size. Many are now having their veterinarian come to their farm to test their bulls.

Performance Test work is a long-term practice with a herd. One herd came on test in the late 1970's with the average calf weighting 225 pounds at weaning. In 2003, the average calf weighed 535 pounds at weaning – a 310-pound increase. The owner of this herd feels that he would have gone out of business had it not been for the Livestock Management Program.

Youth swine projects continue to be popular. Twelve hundred ninety-five (1295) 4-H and FFA members entered 23,355 animals in the three junior shows (market hogs, commercial gilts and the registered breed shows) at the State Fair. The FY '03 District 4-H Horse

Show had 44 4-H'ers from eight counties participate in the show and qualify to go to the State 4-H Show.

c. Scope of Impact - State of Arkansas

d. CSREES Funding – **\$144,691**  
State Matching – **\$69,367**  
Other Funding

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## **Goal 1 – Integrated Research and Extension Program 1 - Sustainable Vegetable Production**

### **Key Theme: Small Farm Viability, Agricultural Productivity**

- a. Brief description of activities – Comprehensive on-farm variety and cultural practices demonstration programs were developed in 2000. In 2003, the Extension Specialist continued to service and expand some of these widely adopted program with direct economic benefits to farmers. The Specialist, with cooperation of the 1862 Extension Agents expanded the on-farm demonstration trials that focused on fewer vegetables (sweet potato, leafy greens and southern pea) that makes the most monies for the small acreage growers. Families generously adopted tastier and higher yielding vegetable varieties introduced to them by on-farm demonstration to capture lucrative market niches with fast growing consumers. Applicable research to lower production cost through sustainable inputs to optimize yields and double returns on investment continued on UAPB Agriculture Farms in Pine Bluff, Lonoke and Marianna. Producers, Extension agents, farm associate meetings were conducted at the producers convenience to weigh impacts of program adoption. The Annual Rural Life Conference, agricultural equipment expositions and multi-state agricultural expositions were attended to conduct a farmers survey and to make presentations on better agricultural practices that emphasizes production risk management. The Specialist published news articles in local newspapers, extension fact sheets, articles in refereed journals, and other rural news outlets to disseminate research results from the experiment stations on varieties adaptable to growing conditions in Arkansas and cultural practices that optimize high yields and increased return on investment.
- b. Impact(s) – The average acreage yield of sweet potato is steadily climbing from an all time low of 305 BU/A total marketable yield in 2000 to 550 BU/A in 2002 and 768 BU/A in 2003 especially in the southeast and southwest corners of Arkansas. Major vegetable producers in Lincoln and Monroe counties have doubled and more than 40% increase in acreage was recorded among growers who planted more than 100 acres of vegetable crops. First time growers in Miller and Little River Counties who incorporated vegetable production into pecan farming increased their acreage by 20% in 2003 compared to 2000 when there was no use of vegetable production for cash flow.

The demonstration program taught growers to develop planting schedules to target early market premium prices. Hence, most farmers with five acres or more, with an average yield of 700 bushels per acre, sold more than 2,500 bushels of their total sweet potatoes at \$16.00 per bushel in 2002 and \$14.80 in 2003 compared to \$5-\$8.00 before initiation of the program. Among all the sweet potato varieties tested the “Beauregard” variety and breeding line 94-96 had the best average yield per acre with better consumers appeal in 2002. North Carolina Bunch, Darby and Bieville produced higher yield in 2003. The farmers were able to sell these varieties quicker and for more dollars, \$5.50 per bushel

compared to the other varieties in 2002 and 2003. Amazing results have been realized from leafy greens which started with a few farmers in Jefferson and Miller Counties and adopted by more farmers in Little River county. Variety Songuin, Seven Top, Purple Top and Florida Broad Leaf Mustard greens had yield increases of 56% in 2002 and 61% in 2003 with minimal inputs at both seasons. The use of environmental stress tolerant variety with early maturing dates allowed growers to sell at a higher price of \$1.80 per grocery brown bag compared to the usual \$0.50 in 2000.

According to Mr. Lloyd and Mary Littleton of Miller county, “Based on your repeated presentations and demonstration results, I converted 40% of my total pecan acreage operation to vegetable production and my cash flow has increased significantly. Vegetables work well with pecan farming especially in my area where I can sell every vegetable crops raised.”

Informed knowledge of okra variety choice continued to redefine the limits of higher income for small acreage growers especially in Lee and St. Francis counties. Canju Delight, Annie Oakly and Green Best hybrids were removed from our demonstration program due to high seeds cost. The program focused on Clemson Spineless. The use of Clemson Spineless and advised cultural practices enabled farmers to realize quality early harvests consistently from 2002 to present. Farmers were able to sell okra for \$3.00 per pound for more than three weeks before the arrival of South America cheap okra that sells for less than \$0.45 per pound. The use of the new okra variety with lower seed cost, high yields and superior quality, increased the average farmers (with five acres) sale revenue by more than 34%.

- c. Scope of Impact - Eastern Arkansas
- d. CSREES Funding – **\$69,179 (Research) \$208,922 (Extension)**  
State Matching – **\$22,202 (Research) \$138,732 (Extension)**  
Other Funding –

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**GOAL 2 – A safe and secure food and fiber system**

## **Executive Summary**

One Extension program, Families First-Nutrition Education and Wellness System (FF-NEWS) supports this goal. FF-NEWS, in collaboration with a consortium of nine other 1890 institutions, is designed to help food stamp recipients improve the health status of family members and effectively utilize food resources. The program includes a curriculum module on food quality and safety.

The project is funded primarily by the USDA Food and Nutrition Service. However, both state and federal 1890 Extension funds augment the program.

## Goal 2 — Extension Program 4 -- Families First - Nutrition Education and Wellness System (FF-NEWS) - Food Safety

### Key Theme: Food Safety

- a. Brief description of activity – The FF-NEWS Program at the University of Arkansas at Pine Bluff offers a comprehensive, culturally sensitive nutrition intervention education program. The program offers a curriculum module on food quality and safety to program participants. One module is devoted exclusively to food safety. This module includes 12 weeks of instruction in basic food safety issues. These issues include safeguarding the family’s health, food borne illness, personnel cleanliness, kitchen sanitation and cross contamination.

Food stamp recipients in the FF-NEWS program are made aware of sanitation practices that contribute to food quality and safety, and are taught procedures used in purchasing, preparing, and storing foods that prevent the spread of bacteria and reduce the risk of foodborne illnesses.

Multi-evaluation methods were employed by FF-NEWS Multi-County Agents to garner participants knowledge of food safety and quality prior to instruction. Food safety informative fact sheets, exhibits and hands-on experience were used to supplement instruction accompanying the educational sessions.

- b. Impact(s) – One-hundred eighty (180) food safety education sessions were delivered by the agents to 3,812 program participants. Related education exhibits totaled 113 for FY 2003, and 242 program participants made request for additional information on the subject.

Sixty-five percent of the participants reported that they use high standards of personal cleanliness in preparing, handling and storing food since attending FF-NEWS sessions. A high percentage (49) also reported that they take special precautions in personal hygiene and food handling when eating out to avoid the risk of food borne illnesses.

Listed below are typical testimonials of what food stamp recipients have said about information gained on food safety.

*After a class on food safety, I wash my hands longer and with warm soapy water.*

- Woodruff County

*I know the only way to be sure that your meat is done, is to use a meat thermometer.*

- St. Francis County

*I learned that to keep foods safe you have to handle them carefully in the grocery store.*

- Ashley County

*A good sanitizer can be made with household bleach and water.*

- Jefferson County

*It's important to clean and sanitize areas where you fix food often.*

- Cross County

c. Source of Impact - Eastern Arkansas

d. CSREES Funding – **\$1,858**  
State Matching – **\$2,168**  
Other Funding – **\$102,698**

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### **GOAL 3 – A healthy well-nourished population.**

#### **Executive Summary**

Two research and one Extension program are supported under the goal, a healthy well-nourished population. Research Program 3 is designed to identify vegetable and herbs that can be produced in Arkansas that have enhanced nutritious value or nutraceutical content. The potential crops are also being investigated for adaptability and cultural requirements. Crops studied include hot pepper, southern pea, bottle gourd and bitter melon.

Research Program 4 is studying the effect of yogurt containing live lactic acid bacteria on respiratory and gastrointestinal problems of pre-school (3 to 5 years) children. This is a cooperative project in collaboration with the Jefferson County Comprehensive Health Clinic, Jefferson County School Districts, and Jefferson County Head Start Program. Anticipated results are less absenteeism from school, reduced costs associated with absenteeism and reduced work-time lost by parents in caring for sick children.

The Extension component under this goal is a multi-state nutrition education program designed to impact the diets of low-income families. Classes were given to 6,236 food stamp recipients. Participants were provided food demonstrations that incorporated nutrition standards and guidelines for healthy eating. This program emphasizes linkages among between culture, food selection and food preparation practices.

### **Goal 3 – Research Program 5 – Vegetable and Herb Production**

#### **Key Themes: Human Health and Nutrition**

- a. Brief description of activities – Replicated field trials were conducted on seven bitter melon varieties/lines to determine yield potentials. About 60 experimental lines of hot pepper were field tested for line selection based on the production potentials and some useful pod characteristics. Nutritional evaluation through chemical analyses of hot peppers is currently underway at the Fruits and Vegetable Research Center at Texas A&M, College Station. Four varieties of bitter melon were analyzed for total Phenolic contents and Phenolic acid components. Three varieties of southernpea, selected based on their Phenolic contents, were analyzed for characterization and functional properties of their respective protein isolates compared with that of soybean. These 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 recipes suitable for consumers acceptance.
- b. Impacts/Accomplishments – Five varieties of bitter melon and four of bottle gourd were identified as having high yield potential in southeastern Arkansas. In general, white varieties of bitter melon had relatively higher total Phenolic content in the edible parts than the green varieties, indicating that bitterness may not be associated with the color pigments. About 20 hot pepper lines were identified as promising for yield potential and ornamental qualities. Results of hot pepper analyses will help identify superior lines for vitamins, antioxidants, and capsaicins as data become available. In a few years, some varieties of bitter melon and hot pepper may be available for on-farm trials and demonstration.

Southernpea varieties showed remarkable variability in their micronutrients, total Phenolic contents, and the functional properties of the protein isolates. Results indicate high potential for nutritional enhancement of southernpea varieties. Higher lysine contents and other protein characteristics of southernpea in general, compared with soybean, may explain its functional properties for potential application in food products.

Bottle-gourd-chickpea soup and bitter-melon-beef stew were among the most preferred recipes taste tested. White varieties of bitter melon were less bitter in taste and thus were more accepted than the green varieties as evaluated by the tester panels.

Improved varieties of bitter melon, bottle gourd, hot pepper, and southernpea (cowpea) may provide additional alternative crops for the small farmers and home-gardeners to realize additional cash benefits. Moreover, these special vegetables may increase health benefits for consumers.

- c. Scope of Impacts – Arkansas and the Southeastern United States

- d. CSREES Funding – **\$109,401**  
State Matching – **\$35,111**  
Other Funding –

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### Goal 3 – Research Program 6 – Health benefits of probiotic bacteria

#### Key Themes: Human Health

- a. Brief description of activities – Results of microbiological analysis confirmed that yogurt from brands Crowley, Dannon Lightn’Fit, Dannon Fruit blends, Shur-fresh, and Breyer contain live cultures of lactic acid bacteria. The health benefits of these bacteria are being studied via feeding trials with pre-school children. Workshops were conducted in Haley, Gabe Meyer East, and Gabe Meyer West Head Start Centers in November 2003 to educate parents and teachers about the project and to recruit children for study. To date, 96 parents have signed the letter of consent authorizing their children’s participation in the study. In addition, an acceptability study was conducted among pre-school children 3 to 5 years old in pre-schools in Jefferson County using the hedonic scale test to find out the flavors of yogurt that children like, The acceptable flavors will be used in the feeding trial to ensure that children consume their yogurt. Two brands of yogurt (Crowley and Shur-fresh) with confirmed live cultures and containing Bifidobacteria were used. Forty-six children aged 3 to 5 years old from Gabe Meyer West head Start in Pine Bluff participated. Using the smiley faces test with 5 scales, 37 children (19 girls and 18 boys) aged 4 to 5 years indicated that blueberry was the most liked flavor for Crowley brand followed by lemon, pineapple, strawberry, and peach. In the Shur-fresh brand, strawberry, was the most liked flavor followed by raspberry, blueberry, and strawberry-banana. Results of the acceptability study were presented at the 2004 Rural Life Conference at UAPB ((abstract #8) and were featured in the University of Arkansas Cooperative Extension Service Features (Kids can tell the difference, March 2004). Right now, preparations are under way to start the feeding experiment to examine the health benefits of yogurt with Bifidus strains when fed to children 3 to 5 years old in pre-schools in Jefferson County by recording the frequency of gastrointestinal and respiratory symptoms.
- b. Impact(s) – We anticipate the acceptance of yogurt will be high during the feeding study as children will be fed yogurt with flavors they like. We anticipate that children fed yogurt containing *Bifidobacteria* (Bifidus) will have reduced respiratory symptoms (fever, runny nose, sore throat, cough, chest wheezes, and earache) and gastrointestinal symptoms (diarrhea, vomiting, and stomach ache). As a result, there will be a low rate of absenteeism from school and fewer parents missing work to care for sick children. Therefore, there will be reduced cost associated with absenteeism of parents from work and reduced expenses for health care. Workshops have been conducted with more than 200 parents from the Pine Bluff area. Up to now, parents have been informed about the nutritional and health benefits of yogurt and yogurt containing probiotics.
- c. CSREES Funding – **\$71,573**  
State Matching – **\$22,971**  
Other Funding –

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### **Goal 3 — Extension Program 3 – Families First – Nutrition Education and Wellness System (FF-NEWS) – Diet and Health**

#### **Key Theme: Human Nutrition and Human Health**

- a. Brief description of activities – FF-NEWS MultiCounty Agents and 1862 Family and Consumer Science Agents participating in the FF-NEWS program provided 270 in-depth lessons in basic nutrition to program participants. Topics addressed were understanding the relationships between nutrition, health, and wellness; food selections and understanding the Food Guide Pyramid and Dietary Guide Pyramid and Dietary Guidelines for Americans.

Food stamp participants in the program were made aware of basic nutrition information and attention was given to the typical dietary patterns of the geographic regions where the participants lived. Information on nutrition and its role in preventing the major disorders occurring in the recipient population was discussed by the agents. The agents also worked with participants to develop self-monitoring as a way to improve health goals.

Program participants were provided with food demonstrations that incorporated the concepts of healthy eating as set forth by nutrition standards and guidelines. Nutrition related exhibits (dietary quality) were displayed along with accompanying hands-on materials and interactive activities.

- b. Impact(s) – The agents provided basic nutrition education to youth and adults through special interest classes to (6,236) food stamp recipients. Three hundred thirty seven (337) requests were made by program participants for additional information on basic nutrition concerns.

A random sampling of (131) program participants yield the following voluntary responses indicating the value of the program to the well being of their families.

- a. 47 percent indicated an increase in their fruit and vegetable consumption after leaning more about food groups.
- b. 38 percent utilize a menu more often to plan meals.
- c. 31 percent walk at least three times a week.

Listed below are typical testimonials of what food stamp recipients have said about the program.

*After today's session, I realized I have a lot of things to think about on getting healthier.*

*- Woodruff County*

*I will eat right and help my family eat right based on what I learned in FF-NEWS.*

- Woodruff County

*I think the program is good and it helps us to eat certain foods that our bodies need.*

- Lincoln County

*This program is very essential to me. It is a very helpful way to learn about nutrition.*

- Jefferson County

*Since being a part of FF-NEWS my daughter asked me to purchase applies and peanut butter to make snack.*

- Cross County

*I've learned to eat more fruits and vegetables daily. I will be using more canned goods when certain foods are out of season.*

- St. Francis County

c. Scope of Impact – Eastern Arkansas

d. CSREES Funding – **\$5,575**  
State Matching – **\$6,503**  
Other Funding – **\$308,092**

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## **Goal 4 — An agricultural system which protects natural resources and the environment.**

### **Executive Summary**

One research project under goal 4, an agricultural system which protects natural resources and the environment, was terminated in 2003. The active research project, research program 8, investigates goat production as an alternative animal farming system. Goats, as small ruminants, offer small and limited-resource farmers an affordable animal production alternative to cattle and swine. Goats have less impact on the environment due to size and other characteristics. Stocking density and approaches to feed management are critical cost factors of profit margins from goat production.

#### **Goal 4 — Research Program 7 Integrated Pest Management**

- a. The research scientist conducting this research retired and the project was terminated.

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## Goal 4 — Research Program 8 — Small ruminant nutrition/management

### Key Theme: Sustainable Agriculture

- a. Brief description of activities — A stocking density and feeding management study using goats confined in concrete slab paddocks was conducted in 2003. In this experiment, a randomized 3 x 3 block design was used to evaluate the effects of stocking density on the feed consumption and growth performance of crossbred South African Boer female goats and wethers. The goats were confined in 8 ft x 8 ft experimental paddocks and fed mixed grass hay and protein concentrate supplementation. The three treatments were as follows: stocking rates of (1) A = one goat per paddock; (2) B = three goats per paddock and (3) C = six goats per paddock. Each of the treatments contained three replicates. The experimental animals were acclimated and fed 1.5 percent body weight (BW) of protein concentrate supplementation ration fortified with minerals and vitamins. Mixed grass hay, water, and trace mineralized salt were provided free choice. Quantitative and qualitative data were collected for eight weeks. The result of the trial indicates that percent weight gain was significantly higher ( $P < .05$ ) in the treatment B than either in treatment A or C. Goats in treatment C had the least average percent gain with wide variations in weight gain performance among the animals within the treatment and replicates. This suggested that the goats in treatment C competed for feed which allowed the more aggressive animals to consume more concentrates and therefore, gain more weight than the less aggressive ones. In the first two weeks of the trial, animals in treatment A appeared to be nervous and consumed their feed at a slower rate than goats in the other treatments. Result of this study indicates that the goats stocked at the rate of three per paddock performed better than animals in other treatments.
- b. Impact(s) — The stocking of too many goats in a specified confined space may reduce their average weight gain and increase weight variation among market sized grow-out animals. On the other hand, the stocking of too few goats in a confined space allowing too much space per animals will reduce the economic potential of the production system. Information collected from these exercises would enable farmers to know that putting too many or too few animals within a confined space may reduce the animals' production performances and the economic potential of the farm. Also, adopting optimal space allocations would increase animal productivity and hence, the farmers' income.
- c. Scope of Impact — Southeast Arkansas
- d. CSREES Funding – **\$120,900**  
State Matching — **\$38,802**  
Other Funding —

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## **Goal 5 — Enhanced economic opportunity and quality of life for Americans**

### **Executive Summary**

Two research projects and one Extension project are supported under Goal 5. The decline in minority farmers and limited opportunities for under-educated minority youth in Arkansas are the underlying needs for these programs.

Research program 6 was designed to identify critical areas that are in need of improvement to enhance business management practices of limited-resources and minority farmers. The research project has identified access to credit, access to markets and management skills as critical areas. Solutions may include changes in marketing strategy, cooperative action among farmers and more collaboration between researchers and farmers.

Research program 7 is investigating the link between problems in school and the level of parental involvement. Researchers are attempting to identify strategies that promote greater parental involvement in the education of youth. A partnership between Pine Bluff and Dollarway Schools in Jefferson County, Arkansas has been established in this study. Additional collaboration will be established with Head Start Programs.

The vast majority of children in single-parent families are in female-headed households where they are more likely to be poor. This is especially true of minority children. Research predicts that children being raised without the support and presence of a father in the home are at greater risk of living in extreme poverty, using drugs, becoming a teen parent, being involved in violent crime, and being incarcerated before they reach the age of 18. Children from low-income, minority families are at risk of repeating grades early in their school years. Many will later become school dropouts. The 1890 Extension family and youth programs address these myriad issues. The Young Scholars Program is designed to reverse the poor academic trends of low-income, minority children and to help them to see college as an achievable option. The parenting program empowers parents and child-care providers to enhance the growth and development of children and adolescents, and the 1890 adolescent pregnancy prevention program emphasizes decision making and is designed to stem the incidence of pregnancy among adolescents.

**Goal 5 — Research Program 8 - The economic status and behavior of minority farmers in Arkansas.**

**Key Theme:**

- a. Brief description of activities — The project has completed the following activities: follow-up survey of minority farmers via interviews with 240 minority farmers; data entry and clean-up of information from the follow-up survey; presentation of preliminary research findings at three national research forums; and a marketing workshop conducted in collaboration with USDA marketing personnel. The project has made the following findings: in the past two years, minority farmers have experienced difficulties accessing credit; minority farmers have not yet built trust with USDA agencies; minority farmers perceive themselves as being left out/marginalized; and participatory action research is an effective tool for building trust between researchers and minority farmers into proactive behavior – or self-advocacy.

The project makes the following recommendations: 1) More collaboration and cooperative action among minority farmers so that they can pool their resources and gain better access to input and output markets; 2) more collaboration between researchers and farmers to ensure that research addresses farmers’ needs and findings are easily translated into effective and sustainable activities on minority and limited resource farms; 3) marketing training to increase the farmer’s awareness of the importance of producing to meet market demand; 4) more direct marketing and value-added processing by minority farmers so that they can capture a larger share of the consumer dollar.

- b. Impact(s) – Request for project findings by the members of the state legislature; farmers have formed a collaborative stake-holders group to make sure that their input on research needs is heard.
- c. Scope of Impact – Lower Mississippi Delta States
- d. CSREES Funding — **\$110,058**  
State Matching — **\$35,322**  
Other Matching —

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## Goal 5 — Research Program 9 - Improving Quality of Life

### Key Theme: Other - Parental Involvement in Schools

- a. Brief description of activities – Two hundred and thirty one respondents completed a parental involvement survey. Findings were that parents’ self-report of their involvement indicates that to a large extent, they are highly involved in their children’s education and they need release time from work to attend school meetings. Very few parents believe teachers are totally responsible for educating children. Interview findings revealed that: (1) parents are critical of themselves as it relates to parental involvement, (2) parents are angered by what teachers say in the presence of their children, (3) parents and educators have diverse definitions of parental involvement and (4) both parents and teachers some understanding of each others difficulties. In February 2004, this study was expanded to include views about parental involvement from Head Start Programs across the nation. A total of 2,300 surveys were mailed.
- b. Impact (s) – This research established a partnership between Pine Bluff and Dollarway Schools in Jefferson County, Arkansas that originated in October 2001. In March 2003, the State of Arkansas passed Act 603, an act to require public schools to create a parental involvement plan. The parent coordinators in each school district requested additional assistance in developing parental involvement plans. As a result of this research, a statewide Summer Institute on Parental Involvement will be held in June 2004, to assist school districts in developing their parental involvement plan and to incorporate activities for both children and families.
- c. Scope of Impact - State Wide
- d. CSREES Funding – **\$91,457**  
State Matching – **\$29,352**  
Other Funding –

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## Goal 5 – Extension Program 6 – Family and Youth Programs

### Key Theme: Children, Youth and Families at Risk

- a. Brief description of activity – **Young Scholars Program:** 2004 marks the beginning of the eight year for the Young Scholars Program. The program is implemented in two Arkansas Delta counties—Monroe and Lee. It targets low-income minority children, ages 6-15, their families and organizations that serve low-income families. Once the children reach age 16 they remain in the program until they finish high school and serve as role models for the other children. The purpose of the program is to reverse the poor academic trends of low-income children.

The program is implemented in housing projects for low-income families. Ninety-six children and their families are enrolled in the program. Referred to as *Young Scholars*, the children meet one hour per day, five days a week in a year-long after-school program. They are taught math and science concepts through agriculture and family and consumer sciences subject matter areas. The children spend a week in summer day camp to refine the skills learned in the after-school program and are taught by scientists from the university who set up mobile labs in the counties. Day camp ends with an awards recognition program that highlights the achievements of the children and parents. Parents are organized into small groups that meet once a week for one hour and they must serve as volunteers in the after-school program. The parental component includes the curriculum for the children as well as information on parenting, job-related skills, career and personal development, stress management and coping skills, family relationships, and economic and self-sufficiency skills.

- b. Impact(s) – Program faculty note a number of positive changes in the children and families. Impacts are noted in the increase of self-sufficiency skills of parents. Eighty-nine percent of the parents have full time jobs. Only 20 percent of the parents worked at the beginning of the program. Eight parents have taken computer training to up-grade work skills. Four parents have completed the CDA training and received the child development associate credentials. Four parents are pursuing college degrees (three at the community college level and one at the University of Arkansas at Pine Bluff). Moving from welfare to work has had a profound effect on the family. For the first time some of the children are seeing an adult in their homes going to work each day. There is a chance that the economic success of many of these parents will improve and they will achieve lasting self-sufficiency. As they gain more education it is likely that they will earn more from their labor so that they can provide for the well-being and security of their families and build assets.

Twelve families enrolled in an assets building program sponsored by the Good Faith Fund of Pine Bluff. They invest up to \$1,000 in savings for buying a home; making repairs or improvements on an existing home; post secondary education; starting a business or improving an existing small business. They receive a return of \$3.00 for

every dollar saved. Three families are now homeowners. The program has connected program families with the ARKids First insurance program to ensure that qualified children have health insurance.

The first six graduates of the program are attending college (5 at the University of Arkansas at Pine Bluff and one at a community college who plans to transfer to the university in the fall). Four of the graduates entered college on scholarships. One attended the BRIDGE Program during summer 2003 and is majoring in Regulatory Science.

a. **Brief description of activity – 1890 Adolescent Pregnancy Prevention Program**

This is the 25<sup>th</sup> year for the 1890 Adolescent Pregnancy and Prevention Program. Developed and taught by the 1890 family and child development specialist, the program has always had an abstinence-based focus. She developed *Teens on the Go*, a newsletter series, to complement the teachings in the program and to strengthen the decision-making skills of youth.

- b. **Impact(s) –** In FY 2003 *Teens on the Go* was used by public school teachers in public schools in 56 counties. Total contacts with teens were 102,366. Each series includes an issue on drug-abuse prevention and teen sexuality. Student evaluations indicate that they gained decision-making skills. One student said: “This newsletter gave me the strength to say NO.” Another student said: “I am glad I read *Teens on the Go*. I got important information that will help me make better choices. This will help me not to throw all the good things away in life. I think more people should read this newsletter to know more about the dangers in life so that they can avoid them when they come along.” An Extension county faculty member said: “We have definitely seen a difference in youth at . . . High School over the past two years. These newsletters are such wonderful material to go along with the Teen Pregnancy Prevention Program I have had for the last three years. It is encouraging to read what these teenagers had to say about *Teens on the Go*. I especially hope you will read the comments about how they wish these newsletters come more often. You are addressing issues that are hard for them to talk about but not read in their own privacy if they heed that.”

a. **Brief description of activity – Parenting Education Program**

The 1890 Extension family and child development faculty work in partnership with county and state agencies, and faith-based organizations to improve parenting skills of parents and the quality of child care programs for pre-school children. Since FY 2000, total contacts for training provided childcare professionals have exceeded 1,300. A diverse population of childcare professionals has been trained representing family day care homes, child care centers, Head Start and faith-based programs. These childcare professionals trained by 1890 Extension faculty have implemented parenting programs in their centers. The curriculum is provided by 1890 Extension. Contacts with parents

exceeded 800 in FY 2003.

- b. Impact(s) – Evaluation indicate the success of the program.

1890 efforts have contributed to over 200 childcare professional successfully completing and receiving child development associate credentials.

- Seventy percent of those trained gained skills for improving the quality of their child care programs.
- Seventy-eight percent used recommended strategies to establish productive relationships with their families.

- c. Scope of Impact – The Young Scholars Program is implemented in two counties. Other programs have state-wide impact.

- d. CSREES Funds — **\$268,142**  
State Matching — **\$80,834**  
Other (private gifts) — **\$45,000.00**

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## **ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS**

### **Part II — Aquaculture/Fisheries Research and Extension Programs**

#### **Executive Summary**

Aquaculture/Fisheries Center research and Extension activities were developed in the two areas of catfish and baitfish production and management under Goal 1. Recreational Fishing in the Delta activities were developed under Goal 5. Specific output from the 2003 programs included the following: 11 refereed journal articles on catfish, 11 on baitfish, and 3 on recreational fishing, 1 book chapter on catfish and 2 book chapters on baitfish, 2 proceeding articles on catfish and 1 on baitfish. In addition, there were 23 published abstracts on catfish, 7 on baitfish, and 6 on recreational fishing. There were 3 extension publications on catfish and 1 on baitfish. There were 3 articles each on baitfish and catfish and 2 on recreational fishing published in Arkansas Aquafarming, the extension newsletter. There were also 23 scientific presentations on catfish and 7 on baitfish.

#### **Stakeholder input process**

Stakeholder input is a continuous process in the Aquaculture/Fisheries Center. In the early part of 2003, researchers and extension specialists devoted time to meeting with the respective trade and professional associations related to aquaculture and fisheries. These include the annual meetings of the Catfish Farmers of Arkansas, the Arkansas Bait and Ornamental Fish Growers Association, the Aquaculture Division of the Arkansas Farm Bureau, the Arkansas Chapter of the American Fisheries Society, and the Arkansas Catfish Promotion Board. During these meetings, individuals have the opportunity to discuss research and extension programming needs with industry representatives. Several members of the Aquaculture/Fisheries Center are requested to meet with the respective boards of the major trade and professional associations in the state. The boards use this as an opportunity to discuss specific research and extension needs of their industry. Scientists and extension personnel then bring these needs back to staff meetings of the Aquaculture/ Fisheries Center for discussion and prioritization.

Throughout the year, Extension specialists relay additional research and Extension programming needs to other faculty and staff through the monthly meetings of the Aquaculture/Fisheries Center. Since Extension faculty are integrated with research and academic programs within the Aquaculture/Fisheries Center, input into Extension activities and programming is also obtained from research and teaching faculty. Four fish health laboratories provide ample opportunities to discuss farm-level problems with growers and to identify research and Extension programming needs.

The National Fisheries Advisory Council composed of local, state, and national representatives,

provide advice and guidance to the program. The council members are selected to ensure to have adequate representation from all sectors of the aquaculture industry and to have representation on natural fisheries issues, problems and priorities.

The new five-year plan for the Aquaculture/Fisheries Center identified specific stakeholders related to natural fisheries programmatic areas. In 2002, representatives of the agencies and groups that were identified as stakeholders were invited to participate in a focus group session. Out of this session grew a new program priority area called Recreational Fishing. Specific objectives for this program include research on population dynamics, stocking programs and hatchery production methods of major sportfish species such as largemouth and hybrid striped bass. Implementation of this program in FY 2003 is expected to enhance tourism in the state and yield economic benefits to the state and communities.

### **Merit review process**

All Evans-Allen research projects and manuscripts that are to be submitted to refereed journals for publication undergo an internal review. The reviewers sign a form to indicate when the manuscript is deemed ready to be submitted. In addition, 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 of the Cooperative State Research, Education, and Extension Service (CSREES). Drs. Romaine and Simco were responsible for reviewing the research and teaching programs of the Department of Aquaculture and Fisheries and Aquaculture/Fisheries Center at the University of Arkansas at Pine Bluff. Drs. Avery and Durborow reviewed Extension programs and activities in the Aquaculture/Fisheries Center.

Several programmatic changes were made in response to the external evaluation. The Extension appointment of David Heikes was changed to provide for a greater time allotment for work on the fish grading equipment. Also, more research information is being included in the Extension newsletter that is published. The web site for the Aquaculture/Fisheries Center is under expansion and will include more research summaries and information.

## **GOAL 1 – An agriculture system that is highly competitive in the global economy**

### **Executive Summary**

#### **Research**

Catfish research in 2003 focused on five main problem areas identified by stakeholder groups: fish health, aquaculture engineering, production economics of catfish production, economic impacts from catfish production, catfish marketing, and water quality management. Specific studies conducted in 2003 included:

- a. Analysis of catfish pricing and market dynamics
- b. Economics of stocker production
- c. Grading catfish for the foodfish market
- d. Row crop herbicide drift impacts on fish pond water quality
- e. Fish disease research and diagnostics

Baitfish research in 2003 focused on 5 main problem areas identified by stakeholder groups: fish nutrition, fish health, treatment alternatives for pond effluents, pond management strategies, and hatchery management strategies. Specific studies conducted in 2003 included:

- a. Fish disease biosecurity
- b. Improving baitfish nutrition
- c. Optimizing stocking rates
- d. Optimizing hatchery methods
- e. Effluent management

#### **Extension**

Catfish extension programs conducted in 2003 included programs in the areas of fish biosecurity, demonstration of new in-pond grading technology for foodfish producers, financial management of catfish farms, and with EPA information collection requests.

Catfish farm prices continued at very low levels throughout 2003. These low levels were due to a combination of factors that included dramatic increases in imports of a Vietnamese fish that was labeled “catfish”, the economic downturn that began in 2001, and the continued aftermath of the Sept. 11 bombing. Extension assistance provided by the UAPB Aquaculture/Fisheries center continued the emphasis on intensive financial analysis of existing farm operations to improve financial decision making, assistance to bankers and bank examiners in understanding the situation of the catfish industry, and continued assistance in fish disease diagnostics. Overall, the UAPB Aquaculture/Fisheries Extension program assisted over 60 individuals with farm financial planning in 2003 and provided a total of 9,912 contacts with catfish farmers.

Baitfish extension programs conducted in 2003 included programs in the areas of fish health, fish nutrition and diets, demonstration of a new feeder for baitfish fry, and with information requested by USEPA.

The baitfish industry has been a stable industry for many years. Over time, however, costs have continued to increase slowly and have slowly eroded farm profits. New hatchery technologies that have developed at UAPB over the last decade have been transferred to the baitfish industry. These new technologies have allowed baitfish farmers to expand production levels on far fewer acres. This intensification has resulted in significant increases in farm productivity measures, decreased dependence on ground water resources and reduced costs of production. The UAPB Extension program provided over 12,600 individual contacts with baitfish farmers and organized 2 educational meetings with baitfish farm organizations.

## **Goal 1 – Research/Extension Program 3 catfish production and management**

### **Project 1 - More Efficient Marketing of US Farm-Raised Catfish**

#### **Key Themes: Competitive agriculture systems in a global economy**

- a. Brief description of activity – In the last 2 years, the U.S. catfish industry has lost significant market share to imported fish and domestic prices experienced a precipitous drop. In order to survive this challenge, the US industry must produce their product more efficiently and improve their marketing to differentiate the US product from inferior quality imports.

In the past year, scientists at UAPB conducted marketing research that has identified differences in consumer preference that can be successfully exploited by the industry to increase sales of the US product. Another study compared the marketing of US fish to that of other seafood products and identified additional areas where the industry needed to make changes in marketing strategies. Industry economic data has been analyzed and provided to the Catfish Farmers of America in support of their anti-dumping suit.

- b. Impacts - Opportunities for improving marketing and increasing production efficiency have been presented at meetings with catfish producers, processors, and invited presentations to the Catfish Farmers of America, The Catfish Institute, and the Arkansas Catfish Promotion Board. Economic data provided to the Catfish Farmers of America was critical in their successful effort to block the dumping of low-priced imported fish into the US.

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## **Project 2 – More efficient production of US farm-raised catfish**

### **Key Themes: Competitive agriculture systems in a global economy**

- a. Brief description of activity –Determining the best management strategy to improve catfish farm profitability is quite complex. Stocker-size fish stocked in multiple-batch production ponds are thought to survive better, grow faster and reach market size sooner.

Whole-farm budget analyses were conducted to evaluate the economics of stocker production in the context of the entire farm. A variety of scenarios were run that were based on data from previous years' production studies.

- b. Impacts – Whole-farm budget analyses have shown that single-batch production of a 37-g advanced fingerling is the most profitable alternative among a variety of stocking sizes and strategies. The second most profitable strategy is the production of 255-g stockers in a three-phased production system. The feasibility of a stocker production strategy is closely linked to ratios of stocking numbers and pond sizes.

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### **Project 3 – Grading catfish for the processing markets**

#### **Key Themes: Competitive agriculture systems in a global economy**

- a. Brief description of activity – To more successfully compete with imported fish, the US catfish industry must increase production efficiency and reduce processing costs. Of critical importance is managing production and harvesting systems to provide a steady supply of appropriately sized fish to processors. Size variation, oversized fish, and undersized fish cause the industry millions of dollars in increased processing costs each year.

An in-pond fish grader originally developed at UAPB to grade fingerlings (and now widely adopted by the industry) has been scaled up and modified to handle thousands of pounds of large fish at a rate sufficient to meet the demands of harvester and farmers. The grader efficiently grades fish into 3 sizes (adjustably) and produces a product in a narrow size range that maximizes processing efficiency.

- b. Impacts - Trials of the foodfish grader in both experimental and commercial ponds showed that the UAPB grader returned from 2-4 times more sub-harvestable fish to the pond for additional growth than the traditional live car grading technology. Economic analyses showed positive net returns and internal rates of return above opportunity costs of capital.

Successful demonstrations and actual use of the grader in commercial situations has occurred and collaborative work is underway with processors to adopt this new technology. Preliminary estimates by the largest catfish processor in Arkansas are that large tightly graded fish may increase plant output by nearly two-fold.

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## **Project 4 – Reducing aquaculture losses caused by pesticide drift**

### **Key Themes: Competitive agriculture systems in a global economy**

- 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 crops produced in Arkansas including 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.

- b. Impacts - Studies showed that herbicides have a very low toxicity to fish and that they are unlikely to kill pond algae at reasonable drift rates. Some pesticides were shown to be marginally detrimental to fish at high drift rates and extremely toxic to shrimp. The results of these studies are used by farmers to evaluate the likelihood of pesticide induced losses, by applicators to assist in decisions regarding safe chemicals and application conditions for treatments near ponds, and by the Arkansas State Plant Board when investigating fish kills.

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## Project 5 – Fish disease research diagnostics

### Key Themes: Competitive agriculture systems in a global economy

- a. Brief description of activity – Infectious diseases are a major source of loss in commercial catfish aquaculture. Reduction of these losses requires timely disease diagnosis and accurate management recommendations.

UAPB maintains 4 fully fish disease diagnostic laboratories. These have diagnosed more than 500 catfish disease cases (out of a total of more than 2,300 cases per year) in the last year and have conducted numerous fish health inspections. Biosecurity education programs have been presented to the industry and technology to limit disease transfer has been developed.

- b. Impacts – The value of the fish in a typical aquaculture pond is about \$50,000. If work by the diagnostic program saves only 10% of the fish in the 500 ponds from which samples are annually submitted (a very conservative estimate) savings to Arkansas catfish farmers amount to more than \$2,500,000 every year. An additional catfish valued at more than \$500,000 per year are exported to other states and countries based on health inspections available only at UAPB.

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### Total Allocated Resources – Catfish Production and Management

Research – CSREES – **\$391,760**  
State Matching – **\$300,470**  
Other

Extension – CSREES – **\$237,197**  
State Matching – **\$194,594**  
Other

## **Goal 1 – Research Program 4 - Baitfish production and management**

### **Project 1 – Fish Disease Biosecurity**

#### **Key Themes: Competitive agriculture systems in a global economy**

- 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 1700 bait and ornamental fish cases in the last year and have conducted numerous fish health inspections. Biosecurity education programs have been presented to the industry and foreign animal disease surveillance programs have been established. New rapid diagnostic tests for viral disease of fish have been developed.

- b. Impact(s) – Three exotic foreign animal diseases affecting bait and ornamental fish have been discovered in the U.S. (Koi Herpes Virus, Spring Viremia of Carp, and Chinese Grass Carp Reovirus). Our work has shown that KHV is now widely disseminated in the U.S. and a real threat to Arkansas koi producers. We made the first discovery of SVCV in the U.S. and have played a very active part in an \$11,000,000 APHIAS program to eradicate the disease from commercial aquaculture. We recently demonstrated that Golden Shiner Virus is really an exotic grass carp virus. Arkansas is the Nation's largest producer of fish species susceptible to these viruses, but our education programs have prevented the introduction of KHV and SVCV and are now helping to reduce the incidence of GSV (established here in 1967). Our surveillance programs have convincingly documented that the viruses are not present and a farm certification program has been instrumental in maintaining markets for Arkansas farmers. Interstate and international bait and ornamental fish exports from Arkansas are valued at more than \$20,000,000/yr. More than 80% of Arkansas exports are from farms that rely on our certification programs to maintain their markets. In addition to our inspection and certification efforts, if it is assumed that our program saves only 10% of the fish in ponds associated with bait and ornamental fish diagnostic cases submitted to our laboratories (a very conservative estimate), savings to Arkansas farmers amount to more than \$4,000,000/yr.

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## **Project 2 – Improving baitfish nutrition**

### **Key Themes: Competitive agriculture systems in a global economy**

- a. Brief description of activity – Spawning and survival of baitfish fry in captivity is variable. Maternal nutrition affects the quality and quantity of eggs and larvae. Trials with fathead minnows and golden shiners examined various lipid sources. No consistent diet effects were seen across tests. Varying lipid sources did not appear to affect fish performance.
- b. Impact(s) – Results so far indicate that egg quality and quantity as well as fry size and stress resistance are not strongly affected by differences in dietary lipid source(s). This gives producers of broodstock diets for baitfish the option of choosing dietary lipids solely on the basis of cost or availability.

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### **Project 3 – Improving the efficiency of baitfish production**

#### **Key Themes: Competitive agriculture systems in a global economy**

- a. Brief description of activity – The majority of US bait and ornamental fish production occurs in Arkansas. Farmers face increasing pressures to keep prices low and must reduce production costs to maintain market share. The production changes most likely to provide this increased efficiency require increased pounds per acre of production and more consistent yields.

Studies have been conducted to optimize hatchery methods (egg collection and hatching, fry handling), and stocking rates.

- b. Impact(s) – Recently completed studies have shown that appropriate feeding and stocking of golden shiner ponds can yield crops far in excess of industry averages. These methods are being adopted by farmers and if spread industry-wide will be expected to increase yields by 200 lb/acre (50%). Farmers can either reduce production acreage, saving \$550/acre annually in variable costs, or find new markets for the additional production. Net returns/acre have been estimated to increase by \$138 for every 50-lb increase in yield. If adopted by the entire industry the impact would be a minimum of \$3.3 million per year.

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## Project 4 – Optimizing baitfish hatchery production

### Key Themes: Competitive agriculture systems in a global economy

- a. Brief description of activity – Arkansas is the leading supplier of farm-raised baitfish in the United States, with annual farm-gate sales in excess of \$22.9 million. Fish farmers in Arkansas supply 80% of the \$18 million of farm-raised golden shiners sold each year. Large shiners are in short supply because it normally requires two growing seasons to produce a “jumbo” fish..

Studies have been conducted to optimize hatchery methods (egg collection and hatching, fry handling), and stocking rates. Broodstock stocking densities were evaluated for fathead minnows. Total egg production over the sampling period generally increased with broodstock density. On average, fathead minnows produced over 2,700 eggs/lb of brooders each day. This implies that for a commercial pond stocked with broodfish at a rate of 500 lb/acre, over one million eggs/acre could be harvested daily, sufficient to stock a one-acre pond. Trials on early-season tank spawning of golden shiners documented production in the range of 6,500 to 22,400 eggs/lb of broodfish over a 2 to 4-day spawning period. Other work at UAPB has shown golden shiners in outdoor pools produce a similar number of eggs, in the range of 5,000 eggs/lb/day. Spawning occurred within 1-2 days after fish were brought indoors.

- b. Impact(s) – Early tank spawning of golden shiners may provide producers with a “head-start” on the growing season in order to produce these large fish within one year, or at least to reach target fish sizes earlier in the season. Arkansas producers also sell \$9.9 million of fathead minnows annually, with rosy red minnows accounting for 45% of total sales. A color variant of the normal fathead minnow, “rosy red” fatheads are highly valued but commercial production is problematic due to poor survival. As an alternative to the traditional spawning/rearing pond method, egg collection and jar hatching of fathead minnow eggs has the potential to help producers meet the market demand for this variety.

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## Project 5 – Minimizing effluents from baitfish farms

### Key Themes: Competitive agriculture systems in a global economy

- a. Brief description of activity – The USEPA is developing effluent limitation guidelines for aquaculture, but there is no information available on effluents from baitfish culture. Arkansas is the nation’s leader in the production of baitfish, with approximately 27,000 acres of earthen ponds. Baitfish farms are primarily family operations or partnerships, and nationally, 93% of baitfish farmers are small businesses, with sales of less than \$750,000.

The University of Arkansas at Pine Bluff participated in a regional project to characterize effluents from aquaculture and to develop recommended management practices to reduce effluent quantities and improve the quality. Researchers conducted on-farm studies to determine solids, biochemical oxygen demand and nutrient concentrations in effluents during pond discharge. In addition, research trials evaluated various methods to conserve water during pond preparation for fry stocking.

- b. Impact(s) – Based on effluent characteristics and with knowledge of farm operations, Extension specialists worked with the baitfish farmer’s association to develop a “Best Management Practices” guide to minimize the environment impact of baitfish farming.

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#### Total Allocated Resources – Baitfish Production and Management

Research – CSREES – **\$302,957**  
State Matching – **\$338,015**  
Other

Extension – CSREES – **\$212,017**  
State Matching – **\$173,937**  
Other – **\$16,439**

## **Goal 5 – Enhanced economic opportunity and quality of life for Americans**

### **Executive Summary**

Research on recreational fishing began in 2003. This work focused primarily on largemouth bass fishery in the Arkansas River. Specific projects conducted in 2003 include:

- a. Stocking hatchery-reared fingerlings to improve largemouth bass populations in the Arkansas River
- b. Stock assessment of black bass populations in the lower Arkansas River reservoirs

### **Extension**

Spending on recreational fishing generates a great deal of economic activity in the Delta region of Arkansas as elsewhere across the nation. Recreation creates over \$200 million in direct revenue along the upper Mississippi River, over 3,000 jobs, and even greater indirect effects. It is likely that the economic value of recreation in the Lower Mississippi River is of similar magnitude. In the Upper Mississippi River System, recreational fishing generated 31% of the total value of recreation, and was the most popular recreational activity. In addition to the recreational value of fishing in the rivers and streams in Arkansas, the thousands of farm ponds across Arkansas and the United States represent an opportunity to provide fishing opportunities for recreation and for profit for farm owners. Properly managed farm ponds will yield two to three times more fish than unmanaged ponds. The UAPB Extension program provided over 1,000 individual contacts with farm pond owners, and organized 3 educational meetings with farm pond owners and in-service training programs for county agents.

Increased opportunities for young people to become involved in fishing may contribute to the development of positive attitudes towards environmental stewardship. Increased community fishing opportunities will contribute to community development. UAPB continues to work with the Arkansas Game and Fish Commission on the Community Fishing Program in Arkansas. The UAPB Extension Program provided over 40 individual contacts on community fishing, and over 300 youth participated in fishing derbies, and in 4-H activities.

## Goal 5 – Extension Project 7 – Recreational Fishing

### Project 1 – Stocking hatchery-reared fingerlings to improve largemouth bass populations in the Arkansas River

#### Key Themes: Protect and enhance the nation’s natural resource base and environment

- a. Brief description of activity –Arkansas largemouth bass anglers are concerned about the low number of large bass in the Arkansas river. The Arkansas Game and Fish Commission is stocking largemouth bass fingerlings in the river as a means of rebuilding depleted stocks. Larger fingerlings have a better survival rate, but are more expensive and time consuming to raise. Smaller fish are less expensive to raise but have poorer survival.

Fingerling bass, marked with oxytetracycline hydrochloride were stocked into two pools of the Arkansas River. Fish collected in fall and spring will be recovered, and otoliths (ear bones) examined for evidence of oxytetracycline. This study suggests that between 15% and 20% of fish in 2002 were hatchery-reared fish.

- b. Impact(s) – Supplemental stocking has potentially increased the year class by 20%. These results are likely to guide the supplemental stocking efforts of the Arkansas Game and Fish Commission and other state natural resource agencies interested in using supplemental stocking as a management tool for largemouth bass.

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## **Project 2 – Black bass population stock assessment for lower Arkansas River reservoirs**

### **Key Themes: Protect and enhance the nation’s natural resource base and environment**

- a. Brief description of activity – There has been growing concern over the largemouth bass fishery in the Arkansas River. Assessment of the stock of black bass in the river will provide a basis for understanding the population of these fish in the river.

Sampling will take place in two reservoirs of the Arkansas River. Fish collected in the field will be measured for length, weight, and condition. Otoliths and stomachs will be extracted. Abundance, age structure, growth, recruitment and mortality will be estimated in different habitats.

- b. Impact(s) – The stock assessment estimates developed will provide a solid basis for understanding the condition of the black bass population in the Arkansas River.

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### **Project 3 – Arkansas Community Fishing Program**

#### **Key Themes: Protect and enhance the nation’s natural resource base and environment**

- a. Brief description of activity – Community Fishing Programs have potential to offer youth of both urban and rural communities activities that will encourage lifetime habits of environmental stewardship and enjoyment of the outdoors.

UAPB assisted the Arkansas Game and Fish Commission in developing the first pilot community fishing programs in Arkansas and continues to work to develop these programs into effective youth activities.

- b. Impact(s) – The Community Fishing Programs have had a positive impact on youth fishing activities, introducing young people to the sport of fishing.

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Total Allocated Resources – Recreational Fishing in the Delta

Extension – CSREES – **\$54,389**  
State Matching – **\$44,620**  
Other – **\$4,281**

**Summary of Expenditures (FY 2003)**  
**(October 1, 2002 - September 30, 2003)**  
**1890 Research and Extension Programs**  
**University of Arkansas at Pine Bluff**

	CSREES	STATE	OTHER	TOTAL
<b>Goal 1. An agriculture system that is highly competitive in the global economy</b>				
<b>Research Programs</b>				
1. Alternative Agriculture	174,326	55,948		230,274
Research SYs	3.2			3.2
2. Crop Protection System	102,040	32,749		134,789
Research SYs	2			2
3. Catfish Production	391,760	300,470		692,230
Research SYs	8.6			8.6
4. Baitfish Production	302,957	338,015		640,972
Research SYs	7			7
Expenditure Total	971,083	727,182		456,444
SYs Total	20.8			20.8
<b>Extension Programs</b>				
2. Livestock Management	144,691	69,367		214,058
Extension FTEs	3.3			3.3
Expenditure Total				
FTEs Total	9.1	2.1		11.2
<b>Integrated Research &amp; Extension</b>				
1. Sustainable Vegetable				
Research Expenditure	69,179	22,202		91,381
Research SYs	1.6			1.6
Extension Expenditure	208,922	138,732		347,654
Extension FTEs	5.8			5.8
Expenditure Total	278,101	160,934		439,035
FTEs Total	7.4			7.4
	CSREES	STATE	OTHER	TOTAL

<b>Goal 2. A safe and secure food and fiber system</b>				
<b>Research Program N/A</b>				
<b>Extension Program</b>				
4. Nutrition education and wellness system (Food Safety)	1,585	2,168	102,698	106,724
Extension FTEs		0.13	1.25	1.38
Expenditure Total	1,585	2,168	102,698	106,724
FTEs Total		0.13	1.25	1.38
<b>Goal 3. A healthy, well-nourished population</b>				
<b>Research Programs</b>				
5. Vegetable and herb production	109,401	35,111		144,512
Research SYs	2.1			2.1
6. Improved health through diet	71,573	22,971		94,544
Research SYs	2.2			2.2
Expenditure Total	180,974	58,082		239,056
SYs Total	4.3			4.3
<b>Extension Programs</b>				
5. Families First-Nutrition Education and Wellness (FF-NEWS) Diet and Health	5,575	6,503	308,092	320,169
Extension FTEs		0.38	3.75	4.130
Expenditure Total	5,575	6,503	308,092	320,169
FTEs Total		0.38	3.75	4.13
<b>Goal 4. An agriculture system which protects natural resources and the environment</b>				
<b>Research Program</b>				
<b>Extension Program N/A</b>				
7. Integrated pest management	Terminated			
8. Small ruminant nutrition/management	120,900	38,802		159,702
Research SYs	3.1			
Expenditure Total	120,900	38,802		307,449
SYs Total	3.1			3.1

	<b>CSREES</b>	<b>STATE</b>	<b>OTHER</b>	<b>TOTAL</b>
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<b>GOAL 5. Enhanced economic opportunity and quality of life for Americans</b>				
<b>Research Programs</b>				
8. The economic status and behavior of minority farmers in Arkansas	110,058	35,322		145,380
Research SYs	2.4			2.4
9. Parents speak (Improving Quality of Life)	91,457	29,352		120,809
Research SYs	2.4			4.8
Expenditure Total	107,795	44,620		266,189
SYs Total	4.8			4.8
<b>Extension Programs</b>				
6. Family and Youth Programs	268,142	80,834	45,000	393,576
Extension FTEs	4.6			4.6
7. Recreational Fishing	54,389	44,620		103,227
Extension FTEs	0.7			0.7
Expenditure Total	322,531	125,454		447,985
FTEs Total	5.3			
EXTENDED TOTAL RESEARCH EXPENDITURE	1,543,651	910,942		2,454,593
EXTENDED TOTAL EXTENSION EXPENDITURE	1,132,518	710,755	494,901	2,338,174
GRAND TOTAL EXPENDITURE	2,676,169	1,621,697	494,901	4,792,767
TOTAL – RESEARCH SYs	34.6			34.6
TOTAL – EXTENSION FTEs	14.4	0.51	5	19.91