

**Texas Cooperative Extension**  
**and**  
**Texas Agricultural Experiment Station**

**<sup>1</sup>Joint Annual Report of  
Accomplishments and Results: FY 2001**

**Texas A&M University System**  
**Agriculture Program**

**For Federal Reporting Year**  
**2001**

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<sup>1</sup> Completed and signed 15 March 2002

**Texas Cooperative Extension (TCE)  
and  
Texas Agricultural Experiment Station (TAES)**

**FY 2001 Joint Annual Report of Accomplishments and Results**

**A. PLANNED PROGRAMS**

**Goal 1: An agricultural system that is highly competitive in the global economy**

**Overview**

Texas Cooperative Extension (formerly the Texas Agricultural Extension Service) and Texas Agricultural Experiment Station programs under Goal 1 focus on increasing the competitiveness and profitability of the agricultural industry in the state, nation, and world. Three programs representing a broad range sector of the agricultural community are represented by this goal. These programs include risk management, field and forage crop production, and, livestock quality and production.

*Risk Management.* Risk is inherent in the food and fiber system. For the Texas food and fiber system to become more competitive, profitable, and sustainable—in light of recent droughts and low commodity prices—farmers, ranchers, and organizations and communities that are dependent on agriculture must be better able to weigh the risks and projected impacts of alternative decisions on their operations. In response to this need, TCE-TAES have developed multifaceted programs for risk assessment and in-depth management/marketing education. In surveys of participants conducted two years after they completed the 1997-98 Master Marketer workshops, 143 producers estimated, on average, that their annual incomes had improved by \$23,900 as a result of adopted marketing and risk management practices. If the 90 producers that participated in the two workshops received similar results, then the aggregate annual impact of this part of the program would approach \$2.15 million in added income! Since all of the Master Marketer graduates surveyed to-date have self reported an average annual income improvement of more than \$20,000, the projected gain in income for all twelve classes would be *more than \$12 million per year.*

*Field and Forage Production.* Environmental stresses, crop pests and global market forces make profitable and sustainable production of crops and forages a continuing challenge. It is through understanding and adoption of TCE-TAES technologies that improve productivity, profitability and global competitiveness of crop and forage production systems that Texas farmers and ranchers will enhance their competitive position to other producers around the world. The target audience includes farmers and ranchers who produce field crops and forage in Texas. The investigations and educational programs associated with Sorghum PROFIT have had many fold impacts. In south Texas, reduced tillage systems netted \$18- to \$30 per acre more profit than conventionally used systems. Systemic insecticidal seed treatments improved crop returns from \$2 to \$24 per acre. IPM programs which encourage field scouting and pest management based upon scientifically established thresholds of insect, weed and disease pests are widely adopted in Texas. Comments from four case studies representing 9 counties are included in the TCE section on Field and Forage Production.

**Sources of TCE-TAES Funding and FTEs**

*TCE Funding: Smith Lever and State Matching*

		<b>\$ X 1000</b>
		<b>Actual</b>
		<b><u>FY 2001</u></b>
Program 1 – Risk Management		1,583
	FTEs	28.61
Program 2 – Field Crops & Forage Production		2,439
	FTEs	138.42
Program 3 – Livestock Quality & Profitability		3,108
	FTEs	176.18
<b>Total Allocated Resources Goal 1</b>		<b>7,332</b>
	<b>FTEs</b>	<b>345.14</b>

*TAES Funding: Hatch, and state, federal and private contracts and grants*

		<b>\$ X 1000</b>
		<b>Actual</b>
		<b><u>FY 2001</u></b>
Program 1 – Risk Management		
	FTEs	
Program 2 – Field Crops & Forage Production		
	FTEs	
Program 3 – Livestock Quality & Profitability		
	FTEs	
<b>Total Allocated Resources Goal 1</b>		
	<b>FTEs</b>	

## **State TCE-TAES Plan of Work Program 1: Risk Management**

**Key Theme:** Risk Management, Agricultural Competitiveness, and Agricultural Profitability

### *A. Description of Activity*

Risk is inherent in the food and fiber system. For the Texas food and fiber system to become more competitive, profitable, and sustainable—in light of recent droughts and low commodity prices—farmers, ranchers, and organizations and communities that are dependent on agriculture must be better able to weigh the risks and projected impacts of alternative decisions on their operations. Managing the increased price and income risk will be key to the future economic success of production agriculture and agribusiness firms in Texas. As economic stress intensifies, risk management—knowing what to do and what not to do—becomes even more important to the long term goal of a profitable and competitive agriculture.

In response to the described need, TCE developed multifaceted programs in risk assessment and in-depth management/marketing education. In the past, management and marketing changes were evaluated based on average results. But, in Texas, averages do not tell the story—the upside and downside swings also must be evaluated for long-term survivability. Educational programs were focused on (1) intensive education in group settings; (2) use of master volunteers to expand efforts; and (3) one-to-one assistance in financial and risk management: In addition to numerous one-day events on risk management topics, two groups attended 64-hour classes as part of the *Master Marketer* workshop program. These 90 individuals greatly enhanced their risk management knowledge and skills. 2) These Master Marketer graduates then become marketing club leaders in their respective counties thereby teaching others about risk management tools. More than 70 marketing clubs statewide have been organized through Master Marketer volunteers and county Extension agents over the past few years. 3) One-to-one producer assistance using district-based risk management specialists was facilitated through the *FARM Assistance* decision support system recently developed. Individual agricultural operations statewide, using information specific to their business, can now effectively assess the riskiness of proposed changes and the projected impact of those changes on their net worth 10 years down the road. Producers completing a FARM Assistance analysis agree to have their information put into a confidential database for the development of educational programs to serve additional producers, some from underserved populations.

The program emphasis in risk management is targeted toward owners and operators of commercial size farms and ranches in Texas. Some of these commercial operations are geographically disadvantaged in that they are located in isolated areas of the state. Marketing clubs and the delivery of education based on the FARM Assistance database will reach underserved populations in later years of the program, such as along the border with Mexico.

TCE is collaborating with other CSREES partners, including Kansas State University, Oklahoma State University, Louisiana State University, University of Arkansas, Mississippi State University, the University of Tennessee, Montana State University, and the University of Minnesota. External collaborators include the Texas Farm Bureau, the Texas Corn Producers Board, the Texas Wheat Producers Board, Texas Cotton State Support Committee, and the Houston Livestock Show and Rodeo Foundation.

### *B. Impact of Programs*

## Texas Cooperative Extension

*Master Marketer Program:* One result of the in-depth Master Marketer Workshops is a few highly trained producers on the subject of risk management. In surveys of participants conducted two years after they completed the 1997-98 Master Marketer workshops, 143 producers estimated, on average, that their annual incomes had improved by \$23,900 as a result of adopted marketing and risk management practices. If the 90 producers that participated in the two workshops received similar results, then the aggregate annual impact of this part of the program would approach \$2.15 million in added income! Since all of the Master Marketer graduates surveyed to-date have self reported an average annual income improvement of more than \$20,000, the projected gain in income for all twelve classes would be *more than \$12 million per year*.

The training appeared to have a major impact on the participants' risk management practices. For example, prior to the in-depth training, 42 percent of the 143 producer-graduates from the 1997-98 workshops said they had marketing plans. Two years later, 91 percent said they had developed marketing plans. Prior to the workshops, 53 percent said they used breakeven costs in marketing decisions. Two years later, 89 percent indicated they incorporated breakeven price information into their plans. Similar improvements were reported for other variables.

Master Marketer graduates agree to share what they have learned with others in their respective counties through small marketing club study groups. This volunteer aspect greatly multiplies the educational impact of the program. More than seventy marketing clubs have been started—helping to extend risk management education to producers across the state. Average membership of marketing clubs has been about 14 producers.

A Risk Management Curriculum Guide has been expanded to provide information to those who cannot attend the in-depth sessions or marketing clubs. These curriculum topics also provide valuable support to marketing club leaders. These publications are available through the National Ag Risk Library, the Texas Extension risk management web site or can be obtained in printed form from local county Extension agents. Underserved audiences could access these excellent materials either way. Of the top 20 requested publications from the National Ag Risk Library, five were part of the Texas Risk Management Curriculum Guide.

The Master Marketer Program Development Team, an integral part of the Statewide Initiative on Risk Management Education, received a USDA Honor Award for Distinguished Service in June 2000. The Team also was successful in national competition for funding to expand the program concept to other states—Montana and Minnesota.

*FARM Assistance:* Financial and Risk Management (FARM) Assistance is a unique combination of risk management specialists working one-to-one with producers—backed up by a powerful computerized decision support system that allows risk assessment of differing strategic alternatives for the farm or ranch. As farming operations are becoming more diverse and complex, individual analyses of risk and financial factors, using research-based tools, are needed. More than 600 alternative risk management scenarios have been analyzed for individual producers since 1999—representing slightly more than a million acres of crop and pasture land.

One measure of the FARM Assistance program's impact is the projected net worth consequences of alternative scenarios analyzed for each subscriber. This measure indicates the gain or loss in net worth a producer could see, at the end of the 10-year planning horizon, from a decision between two alternatives under consideration. Just looking at the difference between the base situation and one alternative scenario implies that producers going through the program, on average, could expect a \$29,000 per year positive difference in net worth compared to selecting the worst case alternative under consideration. For the 10-year planning horizon, that's almost \$300,000 per participant! Seventy-three percent of the FARM Assistance subscribers responding to a survey indicated that their participation in the program allowed them to make a change that will likely have a positive financial impact on their operation. Eighteen percent said the analysis helped them avoid making a decision that likely would have had a negative risk impact.

Two case examples of the program impact are provided here to show the potential: 1) A Midland area producer found that, by adopting drip irrigation technology (developed in part by TAES), he could increase annual income more than \$200 per acre while using scarce water more efficiently. 2) Using the information in his FARM Assistance analysis, a Perryton area producer decided to purchase stocker cattle rather than lease his land—resulting in \$15,000 more income.

In addition to the advantage that individual producers receive for participating in this significant effort, many other producers and associated agri business firms also will benefit from the database that is being developed from accumulating the individual analyses. This secondary impact of the program will be used to further target educational programs. Underserved audiences should be able to glean risk management ideas from database summaries. Publications are planned on best risk management practices, success rates under alternative debt scenarios, and policy impacts on types of operations.

*Output Indicators:*

No. of people completing non-formal risk management education programs—2,710

*Outcome Indicators:*

The total number of people completing non-formal risk management education programs who plan to adopt one or more risk management tools or strategies after completing these programs—1,669

The total number of people completing non-formal risk management education programs who actually adopt one or more risk management tools or strategies after completing these programs—1,088

## **Texas Agricultural Experiment Station**

**Hatch Project 6806:** Analysis of farm, resource, macroeconomic and trade policy on US agriculture. Developed a new methodology for simulating technology assessment and policy analysis. Congress expressed interest in research as replacement for traditional price and income supports.

**Hatch Project 8778:** Economics impacts of agricultural and macroeconomic policy on US livestock and dairy industries. November 99 and Jan 2000 baselines were developed for FAPRI. Presentations of January baseline were given to House and Senate Agriculture Committees and more than 50 farm organizations and groups. Outlook information was used by many Texas producers to reposition themselves and to better survive decrease in milk price supports.

**Hatch Project 6542:** Supporting decision making for sustainable management of grazing lands. The NIRS/NUTBAL nutritional management system was fully implemented in 50 states. Trained more than 400 NRCS employees who impacted more than 1,000 ranches. Surveys revealed that this system has produced increased revenues per exposed cow approaching \$40 per year. Resulting impact exceeds \$300 million to the industry each year with a 20% adoption rate.

**Hatch Project 6556:** Fish Nutrition Research Improves Seafood. Over 12 million pounds of various aquatic crops were raised in Texas in 2000, bringing in a conservative \$39 million. Cultured fish in Texas include the channel catfish, red drum, hybrid striped bass and crawfish. Increasing production efficiency and enhancing nutritional quality of cultured fish will improve the Texas aquaculture industry. Texas A&M researchers are studying dietary requirements of cultured fish and how fish metabolize various nutrients. Scientists have developed practical applications of diet formulations and feeding regimes to increase disease resistance, cold tolerance and product quality. Manipulating nutrition to improve fish quality has been addressed, such as increasing the polyunsaturated fatty acid content and oxidative stability of fish fillets – the fish's ability to maintain nutritional quality and its freshness. This results in more nutritious products for the consumer. As a result of these activities, the cost of feeding and the efficiency of aquaculture production have been dramatically improved, benefitting consumers. Various findings from this project have been used by commercial feed manufacturers and aquaculturists to increase the efficiency and cost-effectiveness of fish production. Incremental improvements in nutrition and feeding account for a conservative annual savings of \$100,000 per year.

**Hatch Project 6556:** Improving Aquaculture Conditions for the Red Drum Fish. Production of the red drum, a fish species native to the Gulf of Mexico, is currently limited to a few commercial facilities along the Texas coast which culture the fish for human consumption and to state hatcheries operated by Texas Parks and Wildlife which produce the fish to enhance wild fish stocks. The red drum has a limited tolerance to low water temperatures, which limits its aquacultural production in ponds. The commercial production of red drum for seafood is approximately 1 million pounds per year. Thus, the fish stocks that must be overwintered each year generally represent over \$1 million dollars in value. Texas A&M researchers are studying the aquaculture conditions of red drum to improve food production and stock enhancement. Laboratory experiments have shown how the red drum adapts to cold water in different salinities and after being fed diets containing different kinds and amounts of lipids, a type of fat. Field trials evaluated advanced thermal refuge designs for overwintering red drum in ponds. Information from the nutritional and thermal-refuge studies is being used with simulation modeling to develop comprehensive strategies for overwintering red drum in ponds. With red drum producers in south Texas using the technology developed by Texas A&M, fish inventories valued at more than \$1 million have been protected from being killed by cold water. The technology also increases the potential for expanding red drum aquaculture to other areas in the state.

*C. Sources of Federal Funds*

TCE: Smith-Lever and State Matching

TAES: Hatch, and state, federal and private contracts and grants

*D. Scope of Impact*

Multi-State Extension – KS, OK, AR, LA, MS, TN, MT, MN

Multi-State Research – MO, VA, CA, GA, OK, HW, AR

Integrated Research and Extension: The development and implementation of the comprehensive *FARM Assistance* computerized decision support system and the resulting accumulated database of economic and financial information is an integrated Research/Extension effort. Faculty of TAES were instrumental in developing the software platform on which the decision support system would be programmed and have been advisors to its enhancements by Extension faculty over the past three years. The structure of the database and initial uses for analytical purposes have been proposed by research faculty to facilitate a viable product.



## **State TCE-TAES POW Program 2: Field and Forage Crop Production**

**Key Theme:** Agricultural Competitiveness, Agricultural Profitability

### *A. Description of Activity*

Environmental stresses, crop pests and global market forces make profitable and sustainable production of crops and forages a continuing challenge. It is through understanding and adoption of technologies that improve productivity, profitability and global competitiveness of crop and forage production systems that Texas farmers and ranchers will enhance their competitive position to other producers around the world. The target audience includes farmers and ranchers who produce field crops and forage in Texas.

### *B. Impact of Programs*

#### **Texas Cooperative Extension**

The investigations and educational programs associated with Sorghum PROFIT have had many fold impacts. In south Texas, reduced tillage systems netted \$18- to \$30 per acre more profit than conventionally used systems. Systemic insecticidal seed treatments improved crop returns from \$2 to \$24 per acre. Reducing row intervals from wide (30- to 40 inches) to narrow (15- to 20 inches) increased yields an average of 6.7%. Proper use of foliar micronutrients netted yield increases of 11.2%. Selection of hybrids with resistance to iron chlorosis increase profits \$7 to \$21 per acre. In the High Plains a region faced with declining water supplies, corn silage was found to use 25% more water than sorghum silage, which is currently not in use in High Plains feed lots, but produces equivalent yields of equal quality forage. Feeding trials are underway to demonstrate the value of sorghum silage. Incorporation of the above practices into Texas production systems is underway and is driven by Extension educational programs.

IPM programs which encourage field scouting and pest management based upon scientifically established thresholds of insect, weed and disease pests are widely adopted in Texas. In four survey areas in Texas (Ellis-Navarro, Hockley-Cochran, Hill-McLennan and Wharton-Matagorda-Jackson counties), IPM programs are heavily relied upon by large agricultural producers to reduce cost of production, reduce pesticide applications and increase profits in the production of field crops. Comments from four case studies representing nine counties are included below.

**Ellis-Navarro counties:** In a study of IPM participants in these North Texas counties, 94 per cent of participants reduced pesticide use. The average reduction of pesticide use by these cotton farmers was 29 per cent, with an average per acre savings of \$13.88 per acre. These two counties produced slightly more than 52,000 acres of cotton in 2000, indicating that if IPM practices were used universally in these counties, savings in the cost of pest management would have amounted to \$722,000 and would have resulted in the use of several thousand pounds fewer pesticides in the environment.

**Hockley-Cochran counties:** Farmers in the western High Plains of Texas are in a very high production risk region due to drought and insect pests. When surveyed, 100 percent of these producers in the IPM program, and 95 per cent of the farmers receiving the *West Plains IPM Newsletter* said that IPM programs improved their ability to make pest control decisions.

Wharton-Matagorda-Jackson counties: Participants in the IPM program in this upper Gulf Coast region widely accepted IMP recommendations. Of those surveyed, 80 percent adopted at least 11 of 13 IPM recommended practices. Seventy-one per cent used fewer pesticides, 79 percent reported harvesting higher yields, and 90 per cent reported higher profits using IPM recommended practices.

Hill-McLennan: County farmers produce wheat, cotton corn and sorghum. IPM participants reported that cotton scouted in the program was treated fewer times than cotton that was not scouted, and that yields of cotton in scouted fields averaged 434 pounds of lint per acre, while unscouted cotton averaged 24 percent less at 349 lbs/acre despite higher pest control costs.

While somewhat dependent upon crop species and location; herbicides are the most widely used class of pesticides. The judicious use of herbicides reduces the expense of crop production by reducing tillage and labor demands; enhances crop yields by minimizing competition with weed species, improves crop quality by reducing foreign matter and moisture in the crop at harvest and reduces spoilage in post harvest storage. The adoption of transgenic crops by Texas farmers has met with a very wide acceptance. Texas Extension faculty are to a large part responsible for disseminating information related to this change. In 1996, the first transgenic crops were commercially planted in the state. This amounted to less than 25,000 acres of soybeans, with no transgenic traits in cotton and corn. In 2000, it was estimated that 65% the state's 400,000 acre soybean acreage was transgenic, the 6 million acre cotton crop was 54% transgenic and 25% of the state's 2 million acre corn crop was transgenic. In soybeans, the only commercial genetically enhanced traits are for herbicide resistance. In cotton, some varieties are sold with herbicide resistance, others with the Bt gene for resistance for worms, and yet still other varieties have a "stacked gene" configuration where a variety has resistance to both herbicide and insects. The first transgenic corn hybrids were released with resistance to insects (the European corn borer), while in 2000, some hybrids incorporated herbicide resistance. To accomplish this large scale transition from traditional to genetically enhanced varieties and hybrids, Extension faculty initiated approximately 300 weed control trials in 2000, as well as large scale plots in the Texas High Plains to compare the value and production expense of transgenic technologies in cotton. Hundreds of educational events were conducted which discussed the new technologies, utility of the transgenic traits in aiding insect and weed control, and potential drawbacks regarding technology fees, marketing and impact on yield and quality.

The herbicide and insect resistance in these major field crops has significantly reduced crop production risk, allowing farmers to produce food, feed and fiber with less production expense, improved environmental quality by allowing farmers to use more environmentally benign herbicides as well as using thousands of tons less herbicides and insecticides, allowed the development of no-till and high residue conservation tillage crop production systems which reduce erosion, decrease consumption of fossil fuels, decrease production cost and improve wildlife habitats.

Educational programming and collaboration between and among several agencies have been used to increase soil testing and reduce the movement of nutrients off site in Texas between 1997 and 2000. These include:

- Soil test phosphorus (P) calibration testing to improve P recommendations in field crops and forages by Texas Extension and TAES. Similar calibration problems exist in other Southwestern states, and TCE-TAES has initiated a joint effort in arriving at better correlation

between soil test P and crop response with Oklahoma State, Louisiana State and the Noble Foundation.

- County and regional meetings and workshops educated 5,000 producers in 70 counties between 1997 and 2000 on soil testing issues.
- Soil Testing/Nutrient Management Campaigns in Gulf Coast counties by Texas Extension, LCRA, Sea Grant, NRCS, TNRCC and other agencies. Soil testing campaigns and questionnaires completed by 3,000 producers representing 150,000 acres during the 1997-2000 years potentially reduced application of nitrogen and phosphorus by 1,400,000 and 2,700,000 pounds, respectively, reducing potential fertilizer costs by \$840,000 and reducing potential offsite runoff on farms participating.
- Development of nutrient management planning certification programs by Texas Extension and NRCS. A Nutrient planner certification program including curriculum and testing was planned and developed in 1999 and 2000. This course and exam will certify individuals affiliated with the government and private consultants to plan nutrient applications to farms to reduce off site runoff of nutrients to keep streams, rivers and lakes cleaner.
- A new method for evaluating soil N content is being tested in the major cropping regions of the state. This technique, when tested in field demonstrations has found large quantities of previously undetected, plant available N that will potentially cause a dramatic decrease in the cost of applied N to field crops and forages. Projects that are being addressed by Extension faculty in the area of cropping systems include: weed management, row spacing, plant population, benefits of seed treatments, benefits of crop rotation, irrigation management, evaluation of brown midrib forage sorghums for silage and in grazing systems, hybrid evaluations including the tan plant type, response to fertilizers and micronutrients and response to reduced tillage. Trials and educational programs are being conducted in the major production areas of the Rio Grande Valley, Coastal Bend, Central Texas, the South Plains and the North Plains. Almost 200 field days, tours and educational meetings have featured information generated by Sorghum PROFIT, a statewide cropping systems initiative in the last two years.

### **Texas Agricultural Experiment Station**

**Hatch Project 6592:** Rice Breeding and Improved Germplasm. This project developed Marker Assisted Selection (MAS) molecular process for breeding and selecting traits for improved rice. This improved and less expensive method was used to evaluate amylose content in rice cultivars, and 2 low-amylose rice varieties (i.e., Cadet and Jacinto) were released this last year to seed growers after 5 years of study rather than usual 7-10. The MAS technologies are now being used to evaluate rice breeding lines in all public rice breeding programs in the USA. The TAES-ARS work in using MAS is the first time this technology has been available for public rice breeding programs.

**Hatch Project 8363:** Control of plant viruses and vectors using transgenic plant technology. This project developed transgenic sugarcane plants with virus and herbicide resistance are being used in USDA breeding programs in Florida to provide new germplasm for sugarcane breeders. The TAES project also has a collaborative project with an industrial partner to commercially develop the use of sugarcane as a recombinant expression system for the economic large scale production of high value

proteins. This project also was a key participant in the first release of transgenic citrus in the USA, with the resistant trees having resistance to important bacterial and fungal pathogens.

**Hatch Project 6223:** Development Cotton Germplasm/Cultivars. This project developed a high yielding cultivar released by South Texas Planting Seed that was the result of direct selection from the Cotton Improvement Laboratory.

**Hatch Project 8045:** Improvement of Oat Productivity. This project developed and released TAMO 397, and this oat has become the dominant oat variety in South Texas, grown on 100,000 to 150,000 acres. Is the only current cultivar suitable for production in south Texas, and a Plant Variety Protection is pending.

**Hatch Project 6375:** Improvement of cotton cultivars. This project developed breeding stocks with characters adapted to short-season, stripper-harvest conditions. Fifteen commercially available varieties contain germplasm from this program.

**Hatch Project 8536:** Development of readily used gene cloning systems for crop plants. This project has developed 70 BAC libraries, the largest collection of BAC libraries in the world. These are key for accelerated genomics research in Texas and elsewhere in the U.S. A database and genomic information system for genomics of agricultural species is being developed, including soybean, chicken and wheat.

**Hatch Project 6383:** Development of improved vegetable legume varieties for southwest. This project developed and released the cowpea variety 'Texas Pinkeye Purple Hull.' This cowpea has sold 200,000 pounds in 2000, indicating that 10,000 acres of this variety were grown. This program also has two new varieties to be released in 2002. Mungbean 'TexSprout' was developed and released by this project, and is grown nationally and internationally.

**Hatch Project 6607:** Development of improved potato varieties for Texas. This project has developed potato varieties adapted to Texas environmental conditions so Texas producers can compete. The high cost of production due to low yields causes Texas producers to struggle to compete in the potato markets. Currently entire russet potato acreage in Texas is planted to improved Russet Norkotah strains developed by this Texas Potato Variety Development Program.

**Hatch Project 8170:** Breeding annual ryegrass for improved forage yield, quality and winter hardiness. This project developed and released TAM 90, a ryegrass developed as a forage crop for Texas and other southern states. The increased forage yield resulting from TAM 90 translates in \$12.7 million/year for ranchers.

**Hatch Project 7134:** Marketing and delivery of Quality cereals and oilseeds. This project developed new food sorghums are being processed into value-added products for ethnic and dietary niche markets. Information provided to Japanese food processors by US Grains Council.

**Hatch Project 8424:** Disease resistance, disease epidemiology and genetic improvement of cool-season cereals. This project developed a hard wheat line TX95D8283 that has been distributed as source of leaf rust resistance for Great Plains. This project also developed a winter barley line TX94D632 with high levels of winter hardiness in high yielding background. These new varieties are high yielding and negate the need to apply fungicides for disease control are saving Texas producers \$2-3 million a year.

### C. *Source of Federal Funds*

TCE: Smith-Lever and state matching

TAES: Hatch, and state, federal and private contracts and grants

*D. Scope of Impact*

Multi-State Extension – OK, KS, GA, MS, AR, TN, KT, NM

Multi-State Research – AL, AR, CA, LA, MO, MS, SC, CO, ID, ME, MI, MN, ND, OR,  
WA, NE, NM

Integrated Research and Extension

Breeders work closely with their extension counterparts in the field trials and evaluation of new cultivars, varietal plantings and demonstrations of advanced lines for county agents, farmers, and specialists.

### **State TCE-TAES Plan of Work Program 3: Livestock Quality and Profitability**

**Key Theme:** Agricultural Competitiveness, Agricultural Profitability

*A. Description of Activity*

Texas ranks first in the nation in total livestock value and also has the broadest spectrum producers and variation in production environments. High production costs and variable sale receipts for all livestock species necessitates adoption of best management practices to efficiently produce livestock and their resulting end-products that are cost-competitive with consumer alternatives while meeting the food quality and safety standards expected by our society. Educational programs are needed to increase producer awareness of consumer concerns, advancements in production practices and developments in technologies to meet those needs while increasing net returns from livestock operations.

*B. Impact of Programs*

#### **Texas Cooperative Extension**

Education programs will focus on livestock genetics, best management practices and how producers can increase production efficiency while still producing high quality end products. Management practices such as selection, nutrition, reproductive physiology, livestock health, and meat science will be emphasized. Other factors that influence product acceptability in the market such as marketing methods and food safety will be stressed. The target audience is composed of beef cattle, dairy, sheep, goat and swine producers, commodity group leadership, Extension educators and youth enrolled in 4-H and F.F.A. livestock projects. Partnerships have been established with CSREES, Texas Agricultural Experiment Station, Texas A&M College of Veterinary Medicine, TAMU College of Agriculture and Life Sciences Departments (Ag Economics, Ag Engineering, Entomology, Rangeland Ecology and Management, and Soil and Crop Sciences), Texas Tech University, West Texas A&M University, Oklahoma State University, Texas Beef Council, Texas Cattle Feeders Assn., Independent Cattlemen's Assn., Texas Association of Dairymen, Texas Pork Producers Assn., Texas Sheep and Goat Raisers Assn., and Texas Farm Bureau.

One thousand seven-hundred forty-five producers from 10 states have participated in the Texas A&M Ranch to Rail program to learn more about how their calf crop fits the needs of the beef industry and what creates value in beef marketing. They learned that they could increase their net return per head by \$82 through retained ownership. They also learned that an effective health management vaccination program at the ranch of origin reduced bovine respiratory disease at the feedyard to reduce production costs by more than \$90 per head.

The database on the 17,000 entries in Ranch to Rail revealed that administration of specific viral vaccines, and the timing of their administration and the days weaned prior to marketing greatly impact production efficiency and carcass quality. The outcome of this result led to development of the Value Added Calf Vaccination Management program (VAC). The four largest cattle marketing organizations in the state have adopted the VAC guidelines and have special feeder calf sales that have resulted in increased values for ranches in excess of \$70 per head due to industry demands for healthier cattle.

In 2000, 229 beef industry leaders participated in Beef 706 to learn more about what creates value in beef carcasses and ways they can change management practices and genetics to enhance carcass value. Seventy-four percent (74%) indicated they would make different business decisions in their ranching operation as a result of participating in this educational program and 100% said they would recommend attending 706 to other beef industry members.

The Texas Pork Quality Assurance Youth Program was created and a curriculum was developed to educate the 26,000 youth swine project exhibitors at livestock shows on food and pork quality wholesomeness. More than 500 County Extension Agents and Vo-Ag instructors have been trained to deliver the curriculum. The National Pork Producers Association has adopted the curriculum and created a handbook to be distributed nationally.

*Output Indicators:*

The total number of people **completing** non-formal educational programs to improve the production efficiency and end product quality of livestock products was 3,840.

Total number of people completing these non-formal educational programs to improve the production efficiency and end-product quality of livestock products who plan to adopt one or more production practices or management strategies after completing strategies after completing these products was 3,400.

<u>3,840</u>	Number of Participants Served by Group Methods
<u>1,400</u>	Number of Participants Served by Individuals Methods
<u>20,000</u>	Number of Participants Served through Mass Media
<u>201,000</u>	Number of Participants Served through web site Access

*Outcome Indicators:*

The total number of people completing these non-formal educational programs who actually adopt one or more new practices or strategies taught at these programs within six months. **To be determined.**

### **Texas Agricultural Experiment Station**

**Hatch Project 2008:** The TAES program on livestock quality and profitability is focused on developing high resolution comparative genome maps aligned across species that link agricultural animal maps to those of the human and mouse genomes, increasing the marker density of existing linkage maps used in QTL mapping and integrate them with physical maps of animal chromosomes, and expanding and enhancing internationally shared species genome databases and provide other common resources that facilitate genome mapping. There is little understanding of genes affecting disease resistance, meat quality and other traits, and this hampers improvements in health and meat quality and production. This project is serving as (1) the custodian of the species map; (2) coordinator of species databases; (3) coordinator of shared material and information; and (4) coordinator for developing research priorities. The project is currently editing and maintaining the bovine genome database for the USDA and to

coordinate bovine genomic research activities in the US, largely through the distribution of DNA from reference families and other mapping resources.

**Hatch Project 8577:** The objectives of this project are to determine the genomic DNA sequence of each transcribed BoLA class I gene and identify potential regulatory signals controlling gene expression; construct a contiguous molecular map of the bovine class I genetic region; identify polymorphic PCR - based microsatellite sequences that are precisely mapped in BoLA to serve as efficient markers for selective breeding. The bovine major histocompatibility complex is thought to be a rich source of genetic information controlling animal health and productivity. We will use a combination of DNA sequencing, reverse transcriptase-PCR and molecular cloning to isolate and characterize the components of BoLA to construct a detailed genetic map of the region that will be utilized to locate genes involved in determining animal health and well-being. Many disease states are associated with genes of the MHC in humans and mice. This project examines the structure and function of the bovine MHC to find homologous genes associated with disease susceptibility in humans and/or mice. The objectives of this project are to identify and sequence expressed genes in the bovine MHC, to identify regulatory signals that control gene expression and to construct a complete contiguous map of the bovine MHC. Accomplishment of these goals will allow us to efficiently exploit the functional genomics databases of the Human Genome project to better understand the role of genetics in controlling resistance to disease in cattle and develop more efficient approaches for improving animal health and productivity. Many disease states have been associated with the genes of the MHC in humans and laboratory rodents and evidence is accumulating that genes in the MHC of cattle also play an important role in determining disease susceptibility/resistance in this agriculturally important animal. The purpose of this project is to precisely identify those genes that are important in determining health and productivity in cattle.

**Hatch Project 6718:** This project is developing high resolution, ordered comparative maps of bovine chromosomes relative to the chromosomal maps of humans and mice, and providing biological reagents for bovine genome mapping to the research community. Two approaches are being used. The first involves the development and use of an interspecific hybrid backcross to produce low resolution ordered maps of expressed genes on bovine chromosomes. The second is the development and use of panels of radiation hybrids to produce high-resolution maps of cattle genes and expressed sequence tags. Genetic susceptibility to disease is a problem for animal production. The purpose of this study is to develop high resolution, ordered comparative maps of bovine chromosomes relative to the chromosomal maps of humans and mice and to provide biological reagents for bovine genome mapping to the research community. This ongoing project is assuring the genetic integrity of their inbred mouse stock by periodic genetic monitoring of allelic composition at defined chromosomal loci. We have been successful in detecting inadvertent outcrossing (contamination) in several strains, thus preventing serious damage to ongoing and new research programs utilizing this resource.

*C. Sources of Federal Funds*

TCE: Smith Lever and State Matching

TAES: Hatch, and state, federal and private contracts and grants

*D. Scope of Impact*



Multi-State Extension – OK, AR, LA, TN, FL, and NM

Multi-State Research – Multi-State Project NRSP-8 (IL)

Integrated Research and Extension: Extension faculty worked with research scientists to identify technologies that could enhance production efficiencies, improve data collection and optimize meat quality. Research on electronics and its adaptation to live stock production was implemented. Electronic individual ear tags were used in Ranch to Rail to facilitate computer-assisted data collection. Also, ultrasound technology developed by researchers was used to determine body composition as it relates to carcass quality. Research faculty updated producers in Beef 706 on how electrical stimulation of carcasses and controlled aging can be used to improve tenderness of retail cuts.

## Goal 2: A safe and secure food and fiber system

### Overview

The Centers for Disease Control and Prevention estimate that food borne diseases cause 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths each year. More vulnerable populations for food borne diseases include the very young, the elderly, and immunocompromised individuals. Medical costs and productivity losses associated with food borne diseases are estimated in the billions of dollars each year, and in Texas, the costs are in the millions of dollars annually.

Statistics indicate that approximately 50% of all food borne illnesses are attributed to improper food handling in restaurants. Because 43-50% of all food dollars are on food prepared outside the home, food safety is a top concern among consumers. Research shows that approximately \$750 can be saved for every food borne illness prevented.

Educational training programs on safe food handling and food borne illnesses are conducted by county Extension agents using the ServSafe curriculum of the Educational Foundation of the National Restaurant Association. The programs include food service manager certification and recertification programs, and front-line employee programs. Basic training and update instructor training is provided or facilitated for those county Extension agents who choose to participate in the program.

As a result of taking the TCE Food Protection Management course, food managers were expected to train their employees in safe food handling practices. Results indicate numerous increases in the knowledge and adoption of proper food handling practices.

Programs in the areas under Goal 2 continue to provide research-based information to commercial food handlers, as well as lay citizens in the state. Educational programs are designed in order for participants to make sound decision on the implementation of best management practices and adoption of technologies. Educational programming has been and will continue to be driven by the needs of our clientele. Results from the Texas Community Futures Forum, and guidance from Executive Program Councils and program committees serve as the basis for this strategy.

The TCE data presented in this summary and the following section represents the efforts of Year 02 of this Plan of Work. Educational programming efforts have been ongoing for many of the areas represented and continue to provide Texas food handlers with opportunities for increased food safety knowledge and skills. Future plans will build on past experiences and emerging issues that may affect our state and clientele.

### **Sources of TCE-TAES Funding and FTEs**

*TCE: Smith Lever and State Matching*

		<b>\$ X 1000</b>
		<b>Actual</b>
		<b><u>FY 2001</u></b>
Program 4 – Food Protection Management		678
	FTEs	32.50
Allocated Resources Goal 2		1,234
	FTEs	58.10

*TAES: Hatch, and state, federal and private contracts and grants*

**Source of Funding and FTEs**

Hatch Funds (\$ x 1000): 150

State Funds (\$ x 1000): 873

FTEs: 6.08

Number of Projects: 39

Number of Publications: 95

## **State TCE-TAES Plan of Work Program 4: Food Protection Management**

**Key Theme:** Food Handling, Food Safety, and Food borne Illness

### *A. Description of Activity*

Background. The Centers for Disease Control and Prevention estimate that food borne diseases cause 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths each year. More vulnerable populations for food borne diseases include the very young, the elderly, and immunocompromised individuals. Medical costs and productivity losses associated with food borne diseases are estimated in the billions of dollars each year, and in Texas, the costs are in the millions of dollars annually.

Statistics indicate that approximately 50% of all food borne illnesses are attributed to improper food handling in restaurants. Because 43-50% of all food dollars are on food prepared outside the home, food safety is a top concern among consumers. Research shows that approximately \$750 can be saved for every food borne illness prevented.

Food Protection Management Educational Program. Educational training programs on safe food handling and food borne illness are conducted by county Extension agents using the ServSafe curriculum of the Educational Foundation of the National Restaurant Association. The programs include food service manager certification and recertification programs, and front-line employee programs. Basic training and update instructor training is provided or facilitated for those county Extension agents who choose to participate in the program. Educational lessons and activities in the Food Protection Management program focused on the following areas:

- Enhanced use of temperature control measures in food service, such as thermometer use, time and temperature control, safe internal cooking and holding temperatures, thawing procedures and general storage temperatures.
- Increased adoption of proper hygiene and hand washing practices of food service employees and managers.
- Increased adoption of practices to avoid cross-contamination such as proper storage, washing and sanitizing of utensils and equipment between use, and employee hygiene practices.
- Increased adoption of receipt and labeling of foods to prevent food waste and spoilage.

Target Audience for Food Protection Management Program. The target audiences for this educational program were managers and front-line employees in food service institutions, companies, and small “mom and pop” businesses who needed or desired training. These contacts included those in both urban and in the underserved rural areas of the state where public health oversight is limited. Care was given to meet the geographically disadvantaged.

Linkages. Internal linkages partnerships and cooperative relationships for the Food Protection Management program included research faculty members of TAES. External linkages included the following: private sector partnerships such as the National Restaurant Association Educational Foundation, corporate industries such as fast food chains and bed and breakfasts, and food distributors. Interagency cooperators included the Texas Department of Health, local public health jurisdictions and trade organizations such as restaurant and convenience store associations.

## *B. Impact of Program*

### **Texas Cooperative Extension**

#### Output Indicators:

In 2000, a total of 40 Food Protection Management (FPM) 16-hour certification training programs and two FPM 6-hour re-certification training programs were conducted throughout the state. A total of 477 food service managers and food service employees completed the training. Of these food service managers and employees, 411 or 86% were from underserved rural areas of the state where public health oversight is limited.

Specific targeted data was not available for the number of front-line and occasional quantity cook education programs conducted.

#### Outcome Indicators:

As a result of taking the TCE Food Protection Management course, food managers were expected to train their employees in safe food handling practices. A statewide telephone survey of a sample of individuals who participated in the FPM certification course was conducted to determine the practices of food service employees both before and after the food service managers and employees had taken the course. This survey found that 94% of the participants had shared the information gained from the course with their employees. Other results reported by outcome indicators were as follows:

<b>Food safety practices of employees:</b>	<b>Before Taking the Course:</b>	<b>After Taking the Course:</b>
Outcome Indicator: Using thermometers and other control measures to adequately monitor temperatures of foods.		
<b>Employees use a thermometer to determine if foods have reached a safe internal temperature.</b>	<b>40%</b>	<b>61%</b>
<b>Employees always reheat leftover or cooked food to 165° F or until boiling.</b>	<b>40%</b>	<b>53%</b>
<b>Employees use a thermometer to check foods for proper holding temperatures.</b>	<b>43%</b>	<b>65%</b>
<b>Employees never thaw foods at room temperature or on the counter.</b>	<b>42%</b>	<b>60%</b>
Outcome Indicator: Training and encouraging employees to use proper hand washing procedures.		
<b>Employees wash their hands with soap and water for 20 seconds.</b>		
<b>Employees always wash their hands with soap and water for 20 seconds after handling raw meat or poultry.</b>	<b>49%</b>	<b>74%</b>
Outcome Indicator: Adopting practices to prevent cross-contamination.		
<b>Employees never use the same cutting board for preparing all types of food.</b>	<b>45%</b>	<b>70%</b>
	<b>49%</b>	<b>68%</b>