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## Abstracts

### SELECTED PAPERS

#### **RISK MANAGEMENT DECISION ANALYSIS (W. G. Boggess, University of Florida)**

**"Approximating the TSD-Efficient Set of Mixtures of Risky Alternatives."** Francis McCamley, University of Missouri.

Previously developed conditions for TSD-efficiency of mixtures of risky alternatives are reviewed. These conditions and other characteristics of the TSD-efficient set form the basis of a tentative procedure for approximating this efficient set. Hazell's data are used to illustrate a critical aspect of the procedure.

**"Preference Among Risky Prospects Under Constant Risk Aversion."** Bruce A. McCarl, Texas A&M University.

Risk analyses often require a measure of individual risk aversion. Here a procedure is presented to calculate risk aversion parameter ranges wherein individuals would exhibit preference among a set of risky prospects. The procedure is also used to investigate risk aversion parameters and parameter sensitivity within published data sets.

**"Risk Efficient Cropping Patterns Among and Across Perennial Cropping Alternatives: A MOTAD Approach."** Paul W. Teague, Texas A&M University.

Numerous studies have analyzed annual crop mix decisions in light of producer risk preferences. Few studies have focused on perennial crop mix decisions. This study attempts to identify not only the optimal mix of grapefruit and oranges for various risk aversion levels, but also optimal planting densities within each species. Experimental plot data from a grapefruit and orange spacing trial over the 1970-82 period were used in a MOTAD formulation to address optimal perennial crop mix and planting density decisions under different capital constraints. An examination of results suggests crop mix and planting density diversification within and across species of citrus as a means of reducing income variability.

**"A Target MOTAD Analysis of Double-Cropping and Alternative Cropping Patterns in Southeast Kansas."** Mario F. Crisostomo, Robert O. Burton, Jr., Orlan H. Buller, and Kenneth W. Kelley, Kansas State University.

The return-risk characteristics of combinations of crop rotations are analyzed using a Target MOTAD model. Study results using data for 1982-86 show that all or most of the cropland is used for rotations that include double-cropping.

**"Prospect Theory and Risk Preferences of Oregon Seed Producers."** Alan Collins, Oregon State University; Wesley N. Musser, Pennsylvania State University; and Robert Mason, Oregon State University.

Prospect theory relates risk preference classifications to gains and losses from a reference income level. This study applied this theory to reinterpret historical studies of risk preferences of Oregon grass seed growers. A significant relationship between changes in classifications of preferences and changes in income were found with those who lost income concentrated in the category of changes to risk preferrers. Changes in risk preferences were also found to be correlated in the theoretically correct pattern with positive measures of risk from crop enterprises. The research therefore is consistent with further applications of prospect theory to farm management.

#### **CONSUMER DEMAND AND EXPENDITURES (M. K. Wohlgenant, N. C. State University)**

**"Food System Demand Estimation: Combining Sample Information with Slutsky Restrictions."** Ann Wilkinson, University of Missouri; and Jon A. Brandt, Purdue University.

A complete demand system for food commodities is estimated using the double logarithmic form. Unrestricted, exactly Slutsky restricted, and mixed estimation approaches were used to estimate the matrix of price and income coefficients. The results suggest that mixed estimation procedures improve on the precision of the coefficients (relative to unrestricted coefficients) and

generate substantially lower predicted errors of the endogenous variables relative to exactly restricted regression.

**"Analysis of Consumer Willingness to Select Lean Meat Products in Houston."** Daniel S. Moin, Oral Capps, Jr., and Robert E. Branson, Texas A&M University.

This study identifies several factors important in the decision by consumers to try lean meat products in several retail food stores in Houston, notably (1) age, (2) residency in Texas, (3) educational level, (4) household size, and (5) predisposition to buying low-fat foods. The analysis rests on the use of the probit model. The source of data is survey information, gathered by telephone interviews, from 200 shoppers.

**"Demand Analyses of Beef, Fish, and Chicken with Scanner Data."** Oral Capps, Jr., Texas A&M University.

Demand relationships for beef, fish, and chicken are examined through the use of scanner data. Own-price elasticities were negative, statistically significant, and in the inelastic range. Cross-price elasticities were generally significant, although negative, indicative of gross complementarity. Total expenditure elasticities were positive, indicative of normal goods. Habit persistence was evident in the consumption of chicken, but not in the consumption of beef or fish. Although the own-price and total expenditure elasticities are not in general disagreement with the literature, the cross-price elasticities are not in accord with traditional perceptions.

**"Consumption Patterns For Alternative Orange Juice Product Forms."** Mark G. Brown and Jonq-Ying Lee, University of Florida.

The demands for frozen concentrated orange juice (FCOJ) and chilled orange juice (COJ) were analyzed using time-series and cross-section data and the seemingly unrelated regressions with error components approach. Over time, COJ demand has grown dramatically at the expense of FCOJ. Regional demand differences also exist; most notably COJ demand is higher in the east than the west. The analysis indicates both demands for FCOJ and COJ have become more elastic and income and the female labor force participation rate, a preference indicator, have had strong positive effects on COJ and

negative effects on FCOJ.

**"Food Expenditure Distributions: Evidence From the Early 1980's."** James Blaylock, U.S.D.A.

This paper presents evidence on the characteristics of the distribution of food expenditures for the years 1980-84. We examine inequality and asymmetry in the distributions as well as the share of national total expenditures accruing to various income groups. We also examine the concept of relative deprivation and provide measures of society's satisfaction with respect to the distributions. Empirical evidence indicates that inequality within the distribution of food expenditures has increased from 1980 to 1984 and the share of total food expenditures accruing to the lowest income groups has fallen. Evidence also appears to indicate that society has become less satisfied with the distributions over time.

**EFFECTS OF POLICIES ON TRADE** (F. J. Ruppel, Texas A&M University)

**"How Strategies to Reduce U.S. Bilateral Trade Deficits in Manufactures Affect U.S. Agricultural Exports."** Nancy E. Schwartz and Barry Krissoff, U.S.D.A.

Recent U.S. policy debate has focused on reducing U.S. bilateral trade deficits in manufactures with Japan and the EC. This paper analyzes how different policies toward these countries would affect U.S. agricultural exports, using a static equilibrium world model for disaggregated agriculture, aggregated Armington-type manufactures, and aggregated non-traded goods. In general, exports are hurt most by U.S. imposition of retaliatory protection on manufactures and hurt less by foreign liberalization of manufactures trade, although both these policies improve U.S. bilateral trade deficits. By contrast, a 10 percent depreciation of the dollar helps agriculture while inducing the largest improvement in bilateral trade deficits.

**"Tariffs, Import Taxes, and Fuel Costs and the U.S. Orange Juice Market."** Richard Beilock, Phillip Crandall, and Clegg Hooks, University of Florida.

The impacts are examined of import charges and fuel costs on the relative costs of supplying U.S. markets from Florida and Brazil and

of supplying imported FCOJ via Florida and non-Florida ports. There are two import charges, the U.S. Tariff and the Florida Equalization Tax. The former is found to provide considerable protection against imports, while the latter's main effect is to place Florida importers at a marked disadvantage to those in other areas of the country. Fuel cost variations have very modest effects.

**"A Profile Analysis of U.S. Exports of Soybeans and Soybean Meal in the Aftermath of the 1973 U.S. Export Embargo."** Alan Webb, U.S.D.A.; and Raymond G. Olsson, University of California-Davis.

Current trade policy discussions frequently center on perceived damage to U.S. competitiveness in agricultural markets caused by U.S. export embargoes. The profile analysis technique is used to test for significant changes in trade patterns after the 1973 U.S. export embargo of soybeans and soybean meal. A sequence of profile tests, which may be generalized to a variety of trade issues, finds that changes in the relative size of Japan's import market is the source of change in U.S. trade patterns in the two commodities.

**"The Impact of the Removal of Support to Agriculture in Developed Countries: Implications for Southern Agriculture."** Vernon Roningen, John Sullivan, and John Wainio, U.S.D.A.

A global trade model shows that the removal of agricultural support in developed countries would result in modest national and global efficiency gains. A prime motive for the current round of trade negotiations is that with multilateral liberalization, producer losses are minimized. Some implications of liberalization for the U.S. are suggested within the context of an analysis of possible effects on Southern agriculture.

**"The Effects of Decoupling Agricultural Subsidies on United States and European Community Budgetary Expenditures and Producer Surpluses."** Dale J. Leuck, U.S.D.A.

Decoupling (i.e., separating) income payments to farmers from prices and production has been suggested as a means of making agricultural trade more responsive to world prices and decreasing government outlays on income support. A graphical welfare analysis illustrates why "decoupling" may result in de-

creased budgetary outlays in the United States but increased outlays in the European Community, with producer surpluses held constant. Results from a world partial equilibrium model indicate the United States' budget outlays could decline by 42 percent and EC budget outlays could increase by 140 percent under decoupling in the long run, using 1984 as a base year. EC budgetary outlays could decline by 9 percent under a modified decoupled program which permits dual pricing.

## **AGRICULTURAL FINANCE MARKETS AND POLICIES (J. B. Penson, Texas A&M University)**

**"Producer-Financed, Farm Credit Subsidy Programs."** Hyunok Lee, U.S.D.A.

This paper examines revenue-feasible, self-financing, farm credit subsidy policies. The lender is assumed to allocate credit to maximize borrower welfare. The analysis presumes information asymmetries exist between lenders and borrowers. Lenders deal with this asymmetric information through the design of self-selecting loan contracts. The main result is: Pareto-optimal income transfers via loan subsidies are feasible to some extent. But, as transfers become larger they eventually incur deadweight loss. Further, curtailing production, a frequent theme of agricultural policy, is consistent with a credit policy redistributing income from high to low income earners.

**"Farm Lender Acquired Property in Perspective."** Jerome M. Stam, Steven R. Koenig, and Gregory R. Gajewski, U.S.D.A.

Agricultural lenders acquired growing amounts of farmland in the 1980's primarily through foreclosure. The increasing inventories present managerial and disposal problems for lenders and influence the farm real estate market. This paper explores issues of lender-held acquired property by estimating lender property holdings, summarizing lender policies, and evaluating it as a factor in farm real estate markets. Results indicate that major institutional lenders now hold an estimated 8 million acres of farmland, valued at \$3.8 billion. This amount is equal to 24 percent of all farmland acres sold annually.

**"Toward An Appraisal of FmHA Farm Credit Program: A Case Study of the Efficiency of Borrowers in Southern Illinois."** Seyed M. Mehdiian, Wm. Mcd. Herr, Phil Eberle, and Richard Grabowski, Southern Illinois University.

A production frontier methodology is used to measure the overall efficiency of a sample of farms obtaining credit from the Farmers Home Administration (FmHA) compared to nonparticipants. The study did not find evidence that the efficiency of FmHA farms improved relative to nonparticipants through time. Results indicate that the overall efficiency of FmHA borrowers is associated with selected financial characteristics of the farms.

**"Effects of Commodity Options Upon Corn Producers' Revenue Compared to Forward Contracts or Cash Sales: Implications for Lenders."** Linwood A. Hoffman, Richard Heifner, and Gerald Plato, U.S.D.A.

Effects of buying put options upon the revenue risks faced by corn producers were evaluated. Results suggest that revenue distributions derived from buying options are similar to those from forward contracting. Forward contracting offers a lower probability of moderately low revenues than does buying options, but options provide a greater probability of large revenues. In certain situations lenders may wish to encourage the borrower to lock-in a price with futures or cash forward contracts and give up the chance for extraordinarily high returns that options offer. Options avoid the problem of raising funds to meet margin calls.

**"Alternative Money Demand Models for the Agricultural Sector."** John F. Yanagida, Naginder S. Dhaliwal, Roger K. Conway, and Michael LeBlanc, University of Nebraska.

This study develops a methodology which accounts for the dual role of money in production and consumption for the farm firm. The transaction and asset demands for  $M_1$  (currency plus demand deposits) are estimated by GLS procedure for the time period 1955-1981. The estimated results indicate the demand for money by the agricultural sector is highly interest inelastic.

**INTERNATIONAL AGRICULTURAL PRODUCTION** (C. O. Andrew, University of Florida)

**"The Effects of Post-Mao Policies on China's Rice Economy."** Catherine Halbrendt, John MacKenzie, and Conrado Gempesaw, II, University of Delaware.

Market liberalization policies in the People's Republic of China, combined with increasing per capita incomes, are generating more efficient fertilizer use, higher rice yields, and a more stable export supply. A simultaneous equation model tested on data since 1961 contrasts forecasts under current versus Maoist policy environments and demonstrates the increased economic efficiency resulting from the Post-Mao policies.

**"Yield Forecasts: Recent Experience from Two African Countries."** Anne Marie Kaylen, University of Missouri.

Regional 1986 yield forecasts for Burkina Faso and Niger are compared with official government figures. The forecasting methods are: a linear regression precipitation model, a linear regression model using satellite-derived information, percentage loss calculations based on meteorological satellite information, a simple average of the above three methods, and expert analysis of the above three methods. The results indicate that the individual methods do not perform as well as the composite methods. The simple average method is recommended because it is replicable, less time consuming, and cheaper to derive than the expert analysis method.

**"Third World Agriculture, The European Community's Common Agricultural Policy and the Uruguay Round: Evidence, Issues and Implications."** Jeff Konz and Mark D. Newman, U.S.D.A.

This paper examines evidence on the impact of the European Community's Common Agricultural Policy (CAP) on groups of third world nations and interests. An improved understanding of the impacts of the CAP on the third world may be useful in predicting potential LDC positions relative to the United States in debates over trade liberalization. After reviewing studies of CAP liberalization, developing countries are categorized by products in which they have interests. The findings underline that since not all third world

nations are likely to benefit from trade liberalization, categorization of interests is essential to understanding potential tradeoffs in the MTN round.

**"Testing the Expected Value-Variance Criterion in a Subsistence Agricultural Situation."** Phil L. Kenkel, University of Kentucky; Donald W. Reid, University of Georgia; and Giles T. Rafsnider and Bernard V. Tew, University of Kentucky.

Quadratic programming models have been suggested as an appropriate method to consider farm planning under uncertainty. The models have gained wide acceptance in portfolio selection in a financial framework, and have been shown to select portfolios which are consistent with utility maximization despite the theoretical restrictions of the model's basic assumptions. The purpose of this research is to provide a further test of the effectiveness of E-V analysis in selecting farming activity portfolios which are consistent with utility maximization under a wide range of general utility functional forms. The primary data set used for the comparison consists of aggregate and individual data from subsistence farming operations in the Abda region of Sofi province in Morocco. The results of the study indicate that the E-V analysis method was generally successful in terms of correlation between activities selected and in terms of utility maximization. The study also indicates that the effectiveness of the E-V criterion can be further enhanced when an upper limit on the appropriate level of risk aversion can be estimated.

**"The Potential for Expanding Production with Traditional Technology."** Mike J. Monson and M. Muazy, University of Missouri.

This research explores the potential for increasing agricultural output in Nigeria using existing technology. A dynamic multi-period linear programming model identifies livestock as a constraining factor. Livestock prove a critical factor in expanding cropland by providing necessary fertilizer and power. Acreage may increase by 50 percent before available labor becomes limiting. Groundnut production increases by 150 percent.

## **AGGREGATE SUPPLY ANALYSIS**

(M. J. Monson, University of Missouri)

**"Modelling Supply Response of Multi-product Farms."** Eldon Ball, U.S.D.A.

This paper models supply response in agriculture using disaggregated output data and tests some key assumptions traditionally maintained in agricultural supply response studies. We approximate the technology in agriculture by a restricted profit function. The properties that allow for dual interpretation of the technology are imposed as part of the maintained hypothesis. The hypothesis that maintains the existence of aggregate price and quantity indexes that satisfy the adding-up property is rejected. We also rule out the existence of individual production functions for each output. Unless joint production is permitted, the resulting estimates of responsiveness of a particular commodity to changes in own price or prices of competing outputs are likely to be considerably underestimated.

**"U.S. Tobacco Supply Elasticity."** Lilyan Fulginiti, World Bank; and Richard Perrin, North Carolina State University.

This paper proposes a new method of estimating the supply elasticity of a quota-constrained product and utilizes the method to estimate the supply elasticity for tobacco in the southeastern U.S.

**"Specification of Price Expectations in Modeling State-Level Multiproduct Agricultural Supply."** Chris S. McIntosh and C. Richard Shumway, Texas A&M University.

This paper applies an approach for choosing between price expectations mechanisms in a multiple equation model when the alternatives are non-nested. Nine alternative specifications of market price and policy information are developed. Price forecasting accuracy, non-nested tests of hypotheses, and out-of-sample predictive accuracy are examined for two states, Texas and Iowa. The results support the use of composite price expectations and further document the importance of government support prices in modeling agricultural supply.

**“Testing the Dynamic Structure of U.S. Agricultural Production.”** Vickie J. Alexander and Fred C. White, University of Georgia.

Adjustment cost theory is used to model quasi-fixed inputs in a dynamic multi-output system of supply and demand. Equations are estimated for major U.S. farm output and input categories for 1944–1985. Own and cross price elasticities are calculated for outputs and inputs. The dynamic structure is tested for fixity of factors and nonjointness of outputs. Capital, labor, and land tend to adjust sluggishly to price changes, indicating the need to model these factors as quasi-fixed. Tests for nonjointness of outputs indicate that crops, livestock and dairy, and fruits and nuts should not be modeled independently of alternative product prices.

**RURAL COMMUNITY DEVELOPMENT** (T. G. Johnson, Virginia Polytechnic Institute and State University)

**“Off-Farm Employment as a Source of Family Income in Louisiana.”** Tesfa G. Ghebremedhin and Tammy Armand-Golden, Southern University.

Off-farm employment is a principal source of income for many farm families, yet this tie between agriculture and the non-agricultural rural economy is often overlooked. It was estimated that approximately 68 percent of the total family income received was for off-farm income, of which 42 percent was earned by the farm operators and 26 percent was earned by the spouses. Farming has become a secondary occupation to some other sources of income and employment for many farm families. It is doubtful that greater reliance on off-farm income is a temporary phenomenon, for it acts as a “safety net” ensuring family survivability.

**“Off-Farm Earnings of Farm Operators.”** Lewell F. Gunter and Kevin McNamara, University of Georgia.

Factors affecting the off-farm earnings of farm operators in the southeast are analyzed through the estimation of a Tobit maximum likelihood model. The new Census Bureau public-use microdata sample, PUMS-D, is used for the analysis. These data contain geographic identification by labor market area, permitting a more detailed analysis of the ef-

fect of local labor market conditions on off-farm earnings than was possible in previous studies.

**“Petroleum and Southcentral Louisiana Employment Multipliers: An Application of a Distributed Lag Model.”** Donald R. Andrews and Uday S. Tate, Nicholls State University.

The Southcentral Louisiana economy received an economic rent from its petroleum resources during the energy crisis of the early 1970's and 80's. A differential export-base model incorporating a geometric lag was developed for estimating aggregate employment multipliers. Results from the analysis indicate that, (1) agriculture, (2) oil and gas mining, and (3) manufacturing are highly significant employment generators. It is estimated that a 10 dollar change in the real price of crude oil will result in a total employment change of 20,250 for this economy.

**“Investment in Education as a Rural Development Strategy: Do Increased Inputs Have an Impact?”** Kevin T. McNamara, University of Georgia; and Brady J. Deaton, Virginia Polytechnic Institute and State University.

Support for public education wavers in a number of states in the U.S. due to a lack of evidence indicating that increased funding is associated with increases in output. Maintaining and increasing this support, however, is critical for rural communities as they seek to strengthen their human capital base as a strategy for economic growth and development. This paper reports the results of an education production model estimated with an expenditure variable specified as a polynomial lag. The results suggest allocating resources to education increases output as teacher quality and quantity and increased funding have positive influence on educational outcomes.

**QUANTITATIVE METHODS** (D. A. Bessler, Texas A&M University)

**“Misspecification in Simultaneous Systems: An Alternative Test and Its Applications to a Model of the Shrimp Market.”** J. D. Lea and J. S. Shonkwiler, University of Florida.

The role of increased imports in the U.S. shrimp market motivates interest in the speci-

fication of existing econometric models that may be relied upon for policy discussions. A test of system-wide specification based on Hausman's specification test is employed in a test of the *a priori* restrictions placed on the parameters of a structural model of the market. The null hypothesis of proper specification is rejected under one form of the test but cannot be rejected under an alternative form. Possible sources of misspecification and substantially different policy implications are suggested by a comparison of unrestricted and restricted reduced forms.

**"Identifying Causal Relationships Between Nonstationary Stochastic Processes: An Examination of Alternative Approaches in Small Samples."** H. O. Zapata, P. Garcia, and M. A. Hudson, University of Illinois.

The paper provides Monte Carlo evidence on the performance in small samples of two commonly used tests of Granger causality for univariate and bivariate nonstationary ARMA(p,q) processes. Tests are applied to the raw data, first differences of the raw data, and a detrended version of the series. The results indicate that for independent series the tests are robust regardless of sample size. With bivariate series and nonstationarity the test results are sensitive to the ARMA specification, to whether the data are filtered and the type of filter used, and the sample size.

**"Bayesian Composite Forecasting of Interest Rates Using Financial Futures."** Timothy A. Powell and Chris S. McIntosh, Texas A&M University.

Many models have been proposed to forecast interest rates. These include econometric, time-series, forward rate, and futures rates models. None have proven to consistently outperform the others. A Bayesian approach was used to combine a time-series model and a futures market expectation model into a composite forecast of 91 day T-Bill interest rates. The three models were compared for 1 week, 4 week, 13 week, and 26 week ahead forecasting horizons. While the composite model didn't always outperform the best forecast for a given period, it consistently outperformed the worst model.

**"Can Principal Components Analysis Provide Better Tests of NIPF Models With Collinear Data?"** Bengt Hyberg, U.S.D.A.

Previous studies of forest management on nonindustrial private forest (NIPF) lands have indicated utility and profit maximization models find socio-economic variables such as income, size of landholdings, and education of the landowner are important in understanding landowner forest management behavior. Unfortunately these variables are collinear, suggesting past statistical analyses are unreliable. Principal component analysis (PCA) is used to conduct a test of the utility and profit maximization hypotheses. These results are compared to a test using a standard logit model. PCA was able to detect two components related to landownership while providing comparable tests of the hypotheses.

## **PEST MANAGEMENT ECONOMICS (G. A Carlson, N.C. State University)**

**"Economic Implications of Screwworm Eradication: Mexico and Central America."** Ernest E. Davis, Ronald D. Lacewell, Lonnie L. Jones, and Teoflio Ozuna, Jr., Texas A&M University.

The screwworm is a flesh-feeding parasite that attacks warm blooded animals, causing livestock mortalities, decreased weight gains, additional labor costs, veterinarian services, and expenses for medicine and insecticides. The economic implications of eradicating the screwworm from Mexico were estimated on a per-head basis for major livestock categories. The largest effects were reductions in producers' variable cost, labor needed, and days necessary to produce an animal. On a per head basis, swine producers experienced the greatest benefit while cow-calf owners received the largest total benefit due to large cattle numbers. Benefit cost ratios ranged from 2 to 4.5.

**"Determining the Risk Efficiency of a Boll Weevil Eradication Program in Mississippi Cotton: A Bioeconomic Simulation Study."** Philip I. Szmedra, U.S.D.A.; and Ronald W. McClendon and Michael E. Wetzstein, University of Georgia.



The Cotton Insect Management (CIM) Simulation Model was employed to evaluate the risk efficiency of a Boll Weevil Eradication (BWE) Program versus a conventional insect control regime in Mississippi cotton under varying levels of grower cost defrayment. Results indicated that a BWE program was risk efficient at all producer subsidy levels and insect infestation patterns modeled.

**“Evaluating the Use of Alternative Breed Type as a Pest Management Strategy: Sensitivity Analysis with Parametric Programming.”** R. Terry Ervin, Texas Tech University; and Francis M. Epplin, Oklahoma State University.

Use of an alternative breed type has been proposed as a management strategy for cow-calf producers confronted with tick infested pastures. The objective of the research reported in this paper is to compare the economics of a Brahman crossbreeding (50% Brahman-50% British) system with a British crossbreeding system. Parametric programming was conducted to evaluate the sensitivity of results to base estimates of breed differences. The proposed strategy to use Brahman crosses on tick infested pastures is economically sound over wide ranges of the parameters considered.

**“An Analysis of Economic Losses From a Pseudorabies Infection in a Swine Growing-Finishing Herd.”** James Kliebenstein, Iowa State University; Kevin Moore, University of Missouri; Dennis Patterson, Missouri Public Service Commission; and David Thawley, University of Minnesota.

Pseudorabies (PRV) is a swine disease present in approximately 10 percent of the swine herds in the United States. Over time the incidence level has been growing, causing several states to examine the feasibility of eradication programs. This study investigates PRV losses encountered in the growing-finishing swine production phase. Losses are estimated from detailed data available from a swine production firm located in the southeastern United States. Loss was projected to range between \$6,039 to \$19,868 per year for a 1,000-head finishing facility. Severity of outbreak and number of outbreaks per year impact on the loss level.

**“Economic Implications of Fumigant Suspensions Illustrated Using a Microcomputer Model.”** Walter Ferguson, U.S.D.A.

Each year the benefits and costs of suspending the registered uses of one or more pesticides are evaluated by the U.S. Department of Agriculture and other government and private agencies. This paper illustrates the use of a welfare analysis microcomputer program, Economic Analysis Simulator (EAS), that is designed to provide sensitivity analysis in assessing the economic implications, for both producers and consumers, of policies affecting the production cost and yield of fruits, vegetables, and specialty crops. A simple illustration involving suspension of registered fumigant uses is used to demonstrate the program.

**FINANCIAL STATUS OF FARMS AND CO-OPS** (D. W. Reid, University of Georgia)

**“Component Causes of Farm Financial Stress.”** Allen M. Featherstone, Ted C. Schroeder, and Robert O. Burton, Jr., Kansas State University.

Suggested methods to reduce farm financial stress have included interest rate buy-downs and debt forgiveness. To what extent financially stressed farms would benefit from these policies is uncertain. This study estimates the proportion of individual farm financial stress that could be attributed to an income problem and a debt problem. The results suggest that 58.9% of 209 financially stressed farms suffered most severely from a debt problem while the remainder of the farms suffered from an income problem. Of the farms that suffered a debt problem, an interest rate buy-down or a debt reduction would be roughly equally effective in the short-run.

**“A Logit Model of the Financial Condition of South Carolina Farms.”** J. Gibson McKenzie and Michael D. Hammig, Clemson University.

A logit model was constructed to assess the impact of various economic and demographic factors on financial stress of South Carolina farms. Data were obtained from a survey of farms for the year 1984. Financial stress was defined as a debt/asset ratio greater than .4. Hypothesized factors explaining stress were farm size, years farming, location, off-farm in-

come, and use of marketing tools. Results for the aggregate of all farms in the survey indicate that mid-sized farms were no more likely to experience financial stress than large farms. Disaggregating data by major farm enterprise did not reveal meaningful further insights.

**"An Analysis of Contributors to Financial Performance of Selected Tennessee Dairy Operations."**

**Larry A. Johnson and Kimberly L. Haden, University of Tennessee.**

The objective of this study is to identify factors which contributed to the probability of success of 81 selected dairy farms in Tennessee. The success measure is identified as returns to operator labor and management. Logit regression with eleven explanatory variables is used to determine factors which led to an increased probability of obtaining positive returns. Increased production per cow, coupled with marketing milk at a higher price, controlling per cow expenditures on feed and fixed overhead, along with an efficient use of debt appear to influence the probability of success.

**"Identification of Country Grain Elevators with Potential for Bankruptcy." Michael S. Kaylen, Gary T. Devino, and Michael H. Proctor, University of Missouri.**

A logit model is developed to aid in the identification of Missouri grain elevators with a large bankruptcy potential. Given audit and bankruptcy costs, a procedure is proposed which optimally determines which elevators should be targeted for extra audits. This procedure is applied to in-sample and out-of-sample Missouri data. The results are quite encouraging. For the most relevant ranges of audit to bankruptcy cost ratios, the method results in savings close to the maximum possible.

**"Evaluating the Financial Performance of Farmer Cooperatives." Alicia N. Rambaldi, Robert B. Wharton, and Ralph D. Christy, Louisiana State University.**

The purpose of this paper is to identify a method whereby bank officials and cooperative management can evaluate the financial performance of farmer cooperatives. Linear discriminant analysis is used to evaluate and classify, based on selected financial ratios, 189

cooperatives and 113 supply cooperatives. Data were obtained from the Jackson Bank of Cooperatives, Credit Information System. Total assets, working capital, debt to assets, and mean rate of return on local assets were the most important explanatory variables in classifying the bank's entire portfolio (189 firms). For supply cooperatives (113 firms), the model selected the above variables, except account receivables replaced working capital.

**EXPORT DEMAND FOR U.S. COMMODITIES (G. A. Mathia, U.S.D.A.)**

**"The Demand and Supply of U.S. Agricultural Exports: The Case of Wheat, Corn, and Soybeans." Tassos Haniotis, John Baffes, and Glenn C. W. Ames, University of Georgia.**

The demand for and the supply of U.S. wheat, corn, and soybean exports is specified in a dynamic framework. Price and income elasticities of export demand and price elasticities of export supply are empirically estimated. Results indicate elastic supply and demand for corn exports and inelastic supply and demand for soybean exports. Stability characterized the corn and soybean markets, but was not confirmed for the wheat market. Soybean export prices were found to adjust in four years, while the adjustment rates for all export quantities and wheat and corn export prices indicate almost immediate adjustment.

**"Export Elasticities for U.S. Soybeans: Estimation Alternatives." Cecil W. Davison and Carlos A. Arnade, U.S.D.A.**

Direct estimation of export demand elasticities using aggregate data in a single (world) equation can produce elasticity estimates different from those obtained by summing country-specific elasticities from country-specific equations. These differences are illustrated by estimating demand elasticities for U.S. soybean exports using both approaches and comparing the results. The single-equation approach provides less information, and, by requiring more assumptions, produces a less-credible elasticity estimate than the multiple-equation approach.

**"The Elasticity of Export Demand for U.S. Cotton."** Patricia A. Duffy, Auburn University; Michael K. Wohlgenant, N.C. State University; and James W. Richardson, Texas A&M University.

The elasticity of export demand for U.S. cotton is an important consideration in designing agricultural policies. Previous estimates, however, have ranged from highly inelastic to highly elastic. In this paper, the elasticity of foreign demand for U.S. cotton was investigated using an Armington framework. Results indicate that export demand is probably elastic with an upper bound estimate of -1.2 and a lower bound estimate of -4.2. Aggregation of individual countries into importing regions did not greatly affect the estimates of the elasticity. Assumptions about the elasticity of total demand for cotton in the importing regions were also fairly unimportant in most regions. The inclusion or exclusion of centrally planned nations in the total calculations did, however, have an effect.

**"The Value of the Dollar and Competitiveness of U.S. Wheat Exports: Further Evidence."** Stephen L. Haley and Barry Krissoff, U.S.D.A.

This report uses a dynamic, econometrically based approach to extend earlier work which examined the effect of exchange rates, U.S. agricultural policy, and world income growth on U.S. wheat exports. This research confirms earlier results that indicate that U.S. wheat exports are strongly influenced by changes in competitors' exchange rates and target prices, and not very much by changes in world income. An important difference from earlier findings is that the time period over which exchange rate changes affect wheat exports is longer. Export levels may not be significantly affected by exchange rate changes for up to four years after the initial exchange rate change.

**"Devaluation in the Value of the U.S. Dollar and U.S. Wheat Exports: Estimates From a World Wheat Trade Model."** Jerry A. Sharples and Praveen M. Dixit, U.S.D.A.

The World Wheat Trade Model is used to study how a devaluation in the value of the U.S. dollar impacts U.S. wheat exports. Model results indicate that a uniform 10-percent devaluation in the value of the U.S. dollar relative to all other currencies leads to a

5.6 percent increase in U.S. wheat exports. When the corresponding currency-specific changes in exchange rates relative to the U.S. dollar were put into the model, U.S. wheat exports increased by less than one percent. This shows the importance of identifying, country-by-country, where the dollar is changing in value.

## **EVALUATION AND ADOPTION OF CHANGING FARM TECHNOLOGIES (S. E. Offutt, U.S.D.A.)**

**"Factors Influencing the Adoption of Technology: The Case of Insect Sweep Nets in Texas Rice."** Jayson K. Harper, M. Edward Rister, James W. Mjelde, Warren R. Grant, Michael O. Way, and Bastiaan M. Drees, Texas A&M University.

Logit analyses are used in evaluating mail survey data collected during 1986 from Texas rice producers. Effects of several rice production attributes on two dichotomous decisions, the use of sweep nets and the spraying of insecticides, are investigated. Both decisions are associated with management of the rice stink bug. The reported models accurately predict 81.8 percent and 91.4 percent of the respective type decisions. Historical rice stink bug management is significant in explaining producers' decision-making behavior in both models, with several other attributes significant in each respective model. The reported results demonstrate the potential contributions to both research and extension programs of using this type of methodology.

**"Are Early Adopters Risk-Lovers or Just Optimistic? A Case Study of Southern Illinois Farmers Swathing Wheat to Increase Double-Cropped Soybean Yields."** Phillip Eberle, Donald Stucky, and Zaki Wissa, Southern Illinois University.

An economic analysis of the wheat swathing method to increase double-cropped soybean yields in southern Illinois is performed. The decision to adopt the wheat swathing method depends on whether the increase in soybean yield which is quite variable justified the added costs of swathing wheat. Yield data from field trials and subjective yield distributions elicited from farmers were used to evaluate the decision.

**"Soybean Seed Quality Differentiation: A Market Share Valuation Approach."** Jack E. Houston and Kihong Jeong, University of Georgia.

Variation in Southeastern soybean plantings and the introduction of multiple varieties have increased uncertainty in the supply of the demand for soybean seed in local and regional markets. A share valuation approach is used to estimate potential returns to seed quality differentiation through genetic breeding research. Indications of the analysis pooling cross-sectional and time series observations narrow important quality market characteristics to yield, resistance to Southern root knot, and resistance to the soybean cyst nematode race 3 and 4.

**"Determinants of Prices Paid for Production Tested Boars."** L. W. VanTassel, W. W. McNeil, and R. H. Simms, University of Tennessee.

The degree to which daily gain, feed efficiency, back fat, and an overall performance index explain the pricing structure of boars sold at central test stations in Tennessee was examined. Less than 50 percent of the variability in prices was explained by these test measures. These measures were better indicators of price deviations when individual purebred breeders were examined.

**"Evaluating the Growth Trends of Selected Cotton Varieties in Louisiana."** Kenneth W. Paxton, John F. Denison, and David R. Lavergne, Louisiana State University.

This paper uses the logistic growth curve to describe the process of diffusion for four cotton varieties in Louisiana. The approach taken in this analysis follows that of some original work by Griliches. The slope of the logistic growth function measures the average rate of adoption for a particular variety. Results of this study indicated both positive and negative adoption rates. The negative adoption rates found in this study are considerably different than those found by Griliches. The high degree of substitutability among cotton varieties and the marginal differences in profitability across varieties explain results obtained in this paper.

**FARM MANAGEMENT DECISION ANALYSIS** (M. E. Wetzstein, University of Georgia)

**"Incorporating Plateau Response Functions Into Farm Management Curriculum."** Francis M. Epplin and Raymond Joe Schatzer, Oklahoma State University.

Crop growth response functions are often depicted in undergraduate textbooks as polynomials. Some studies indicate that plateau functions provide a better representation of plant growth. Quadratic and plateau models were used to estimate corn response to nitrogen fertilization functions. The plateau model provided a better statistical fit. Point estimates from the model were incorporated into a set of enterprise budgets to illustrate a method for directly linking production theory with application. The influences of alternative fertilization levels on factors such as operating capital, which are often ignored in textbook theory sections, can be illustrated directly with the method.

**"Does Economic Theory Specify? A Methodological Note."** Harry H. Hall, University of Kentucky.

Several functional forms that are equally consistent with neoclassical production theory are fitted to data on corn-yield response to lime. The usual statistical goodness-of-fit tests do not discriminate among these functions either, although their optimal lime rates vary widely. Excessive emphasis on either specification bias or statistical goodness-of-fit may be misguided.

**"A Risk Programming Model for Aeration Decision Making by Aquacultural Producers."** Carole Engle and Upton Hatch, Auburn University.

A risk programming model using Target MOTAD methodology was developed to address the aquacultural producer's aeration decision making process. The effects of stocking rate, aeration yield response, and availability of labor, capital, and electricity were analyzed parametrically.

Continuous aeration with electric paddlewheels was most often selected by the model. However, as farmers become increasingly concerned with financial risk, they substitute first continuous aeration with pump sprayers,

then no aeration, and lastly emergency aeration with tractor-powered paddlewheels. Emergency aeration was only used when: 1) electricity was not available and the producer desired a highly conservative financial strategy and 2) the relative efficiency of continuous aeration in the field was dramatically reduced from experimental results.

**"Economic Analyses of Space Management Practices in High Density Pecan Groves."** Harvey J. Witt, John R. Allison, and Jeff W. Daniell, University of Georgia.

A growth equation and a yield relationship were calculated to estimate space requirements and yields of pecan trees. The resulting estimates were used with pruning cost estimates to determine the orchard space management practice that maximizes income over time.

**"Capital Investment Decisions: Improving the Accuracy of Net Present Values by Using Monthly Cash Flow Data."** Jana L. Smith, Bernard V. Tew, and Garnett L. Bradford, University of Kentucky.

Most previous farm capital investment studies have used yearly cash flow data. But the theory of time-money relationships clearly implies that, compared to monthly data, yearly data can significantly overestimate net present values (NPV's). The degree-of-error is shown to depend upon the cost of equity capital, the degree of financial leverage, the marginal income tax rate, and (most importantly) the length-of-life of the investment. For a \$9,000 incremental investment in more land, with a 30-year life, yearly NPV's range from 3 to 24% greater than monthly NPV's. In comparison, for a \$9,612 incremental investment in a pickup truck, with a 5-year life, yearly NPV's range only from 1.5 to 4.3% greater than monthly NPV's.

## **AGRICULTURAL POLICY: ATTITUDES AND PROPOSALS**

(J. W. Richardson, Texas A&M University)

**"Attitudes Toward Government Involvement in Agriculture: Results of a National Survey."** Joseph J. Molnar and Patricia A. Duffy, Auburn University.

This study reports results from a nationwide survey of public attitudes towards agriculture. The study focuses on attitudes

towards government across residential categories.

**"Determination of Variable Support Price Schedules to Control Crop Production."** Wen-Yuan Haung and Bengt Hyberg, U.S.D.A.

Variable support price (VSP) programs can be employed to control national crops production without directly imposing production restriction to a farm. This paper investigates methods of determining a set of the farm-level commodity VSP schedules for production control and distribution of the program benefit to targeted farm groups participating in the VSP program. An illustrative application to control of corn, soybean, and wheat production in the U.S. is included.

**"Integrating Farm and National/Regional Models for National Agricultural Policy Analysis."** John Sutton, Bengt Hyberg, and Mike Dicks, U.S.D.A.

Direct use of micro model results in national policy analysis always founders on practically unavoidable aggregation errors. Yet, estimating policy effects requires a broad knowledge base, one that includes perspectives from both the farm and national levels. This paper presents projected impacts of the 1985 Farm Bill on land use, erosion, farm income, and Federal costs from perspectives of a cash grain farm and the national NRLP model. Study of reasons for similarities and differences in results from farm models and the NRLP model should enhance an analyst's ability to objectively interpret and present impacts of national soil conservation policy.

**"The Conservation Reserve Program: Characteristics of Eligible Participants and Nonparticipants."** J. Dixon Esseks and Steven E. Kraft, Southern Illinois University.

During the summer of 1986, 1168 farmland owners from across the nation with land eligible for the Conservation Reserve Program (CRP) were surveyed. 664 had been bidders in the first two sign-ups or planned to bid in the August signup. The survey sought to reveal obstacles to the CRP's success. Data presented indicate 47 percent of the nonbidders thought their land was ineligible, 25 percent found the rental rates too low, and 13 percent thought the contract period too long. 55 percent of the bidders used conservation based

reasons to explain their participation. Logit analysis revealed that bidders tended to be aware of soil erosion problems on their land, were young, had recently received aid from SCS and were current farm operators. Results are interpreted in light of suggestions for changing the CRP.

**"Targeting the Conservation Reserve Program for Economic Efficiency." Michael R. Dicks and Edwin Young, U.S.D.A.**

The cost of controlling erosion on the nation's most erodible cropland and reducing the acreage of surplus crops depends more on how the Conservation Reserve Program is implemented than on the actual number of acres enrolled. During the February 1987 (CRP) sign-up period some 8.8 million acres were enrolled for a net cost of \$25 per acre. Using a multiple objective selection criterion and selecting the minimum acreage required to meet enrollment goals, a net cost of \$2 per acre is achieved.

## **LIVESTOCK-FEED SECTOR**

**ANALYSIS (D. H. Laughlin, Mississippi State University)**

**"Interregional Competition in the U.S. Turkey Industry: A New Methodology." Stephen A. Ford, University of Florida.**

The U.S. turkey industry has changed greatly in recent years. This paper analyzes interregional competition in that industry using a new analytical approach. Econometric forecasting methods are combined with fixed supply, spatial price equilibrium solutions in a market simulation model. The results show that turkey production will become even more important to the South Atlantic region in the future. All regions, however, continue to expand turkey production over the simulated period.

**"Impact of Growth Regulators on Broiler Farm Profitability." C. M. Gempesaw, II, J. R. Bacon, and C. Halbrendt, University of Delaware; and J. W. Richardson, Texas A&M University.**

Technological breakthroughs in recombinant-DNA technology and molecular biology have provided the means to produce growth regulators on livestock production. This study evaluates the impact of growth

regulators on the broiler farm profitability in two major broiler producing areas—the Delmarva region and Georgia. A broiler-grower simulation model (CHICKSIM) was used to analyze the impact of growth regulators on the representative farms' profitability. The empirical results show that broiler farms experience an increase in profitability due to the use of growth regulators only if survival rates and broiler prices are not affected by the shorter turnaround production cycle.

**"An Economic Analysis of Slaughter Hog Market Weights." Rodrick A. Skewes, Caterpillar Tractor; and Loren A. Ihnen and Stephen A. Hatchett, North Carolina State University.**

A dynamic equation relating optimum slaughter weight to current input and slaughter prices, interest rate, and future profitability is estimated for North Carolina and for a ten-state cross-section. A major finding is that producers consider the profitability of replacement hogs when making current marketing decisions.

**"Feed Quality Variation and the Organization of Feed Manufacturing and Distribution System." Keith L. Menzie, Lee F. Schrader, and Paul V. Preckel, U.S.D.A.**

Increased on-farm feed production has led to a growing concern among livestock producers and commercial feed manufacturers about the effects of increased variability in the quality of feed. A forty region nonlinear programming model of livestock feed manufacturing and distribution system is used to examine system organization and performance for different degrees of feed quality variability. Greater quality variation for feed prepared on-farm was found to result in a larger commercial system and more use of complete feed programs.

**"Alfalfa Hay Market Organization and the Competitive Status of Kentucky in a Regional Hay Market." Barry W. Bobst and Lionel Williamson, University of Kentucky.**

Side-effects of a proposal to change the structure of Kentucky's alfalfa hay marketing system so as to make it more accessible to out-of-state buyers are evaluated by means of spatial price analysis. The proposal's intent is to increase the derived demand for alfalfa pro-

duced in Kentucky. However, empirical analysis indicates that Kentucky's alfalfa market is not in spatial equilibrium with markets in neighboring Corn Belt states. Structural change which improves market accessibility may, therefore, also lead to an increase in supply in the Kentucky alfalfa market from out-of-state sources.

## **RURAL COMMUNITY SERVICES**

(J. C. Hite, Clemson University)

**"Pricing Rural Community Water Under Subsidy." Dean F. Schreiner and Suki Kang, Oklahoma State University.**

Public subsidy to rural water systems is substantial. Nationally, the Farmers Home Administration (FmHA) through September, 1986, has provided \$2,896 million in grants and \$9,132 million in subsidized loans. For Oklahoma, FmHA subsidy amounts to about \$0.83 per thousand gallons of water supplied. Higher income families receive larger subsidies than lower income families, and those seeking psychic benefits from rural environments are subsidized. Improved pricing strategies for rural water can better target public subsidy to meet policy objectives of reducing water costs to low income households and rural fixed location residents.

**"An Economic Analysis of Public Water Utilities in Georgia." Young-Hyo Ha and Josef M. Broder, University of Georgia.**

The financial performance of public water utilities in Georgia was examined. A theoretical framework was developed to explain why many local governments operate their water utilities at a loss. Ordinary least squares was used to explain differences in net revenues per capita.

Results indicated that age of plant, number of customers, and percentage of customers outside the jurisdiction were positively related to net revenues. Water production levels, block rate schedules, number of employees, number of manufacturing firms, and home values were negatively related to net revenues. Implications for water pricing and for subsidizing local water utilities were discussed.

**"The Economics of Water Quality Improvement: A Case Study of the Coordination Problem." Carolyn M. Fonyo and William G. Boggess, University of Florida.**

Achievement of broad policy goals may be augmented through combined efforts of public decision-makers and the private sector. Coordination of multiple objectives requires institutional arrangements that facilitate interaction among these groups. A case study of an in-lake management strategy is examined that provides a marketable product while potentially satisfying public water quality objectives. The common linkage is direct and indirect subsidization of a methane gas production system which removes nutrients from a eutrophic lake through aquatic plant harvesting. The amount that a management agency would be willing to pay for water quality improvement is equated with the value of expected public benefits.

**"Public Service Expenditure Model for Rural Communities of Western Oklahoma." Ron A. Loewen and Gerald A. Doeksen, Oklahoma State University.**

Six categories of current community service expenditures from a sample of western Oklahoma communities were regressed upon economic and demographic variables. The study period was a ten-year period (1975-1984) highlighted by declining farm income and an oil boom and bust. Current community service expenditures were found to be significantly influenced by community population, per capita income, capital expenditures in the previous year, and, in the case of street expenditures, the local sales tax rate. Economies of scale were indicated for solid waste disposal and street maintenance implying consolidation as a possible strategy to lower current expenditures on these services.

**"Some Economic Impacts of Developmental Highways in Rural Georgia." Teresa D. Taylor, Josef M. Broder, and Kevin T. McNamara, University of Georgia.**

This research examines six developmental highways constructed in rural Georgia from 1975 through 1981. Regression discontinuity time-series analysis was employed to measure changes in population, number of manufacturing firms, manufacturing employment, service employment, per capita gross income, and taxable sales associated with the construction of developmental highways. This study found that some counties experienced economic growth with highway development and others experienced economic decline. Implications for local policy makers were discussed along with suggestions for needed research.

## **AGRICULTURAL POLICY: WELFARE ANALYSIS (K. J. Collins, U.S.D.A.)**

**"The Simple Analytics of the U.S. Peanut Program." Randal R. Rucker and Walter N. Thurman, North Carolina State University.**

Peanuts are one of two major commodities subject to a form of federal production control (the other being tobacco). The success of the peanut program in recent years in reducing budget costs has drawn attention to it as a model for other commodity programs. There are, however, welfare considerations in addition to budget costs and transfers. Empirical estimates of one major category of these effects are presented.

**"Welfare Implications of the Wool Act." Glen D. Whipple and Dale J. Menkhaus, University of Wyoming.**

A model of the U.S. sheep industry is estimated and simulated to determine the impact of the Wool Incentive Program on actors in U.S. sheep product markets. The supply section of the model incorporates restrictions on fixed capital and demographic characteristics of the breeding flock. The model indicates that the benefits of the Wool Incentive Program have exceeded costs over the life of the program.

**"Distribution Effects of the Marketing Loan Program: The Case of Rice." William W. Lin, U.S.D.A.**

This paper provides estimates of the distributional effects of the 1986 marketing loan program for rice. The finding reaffirms that the program is quite costly, and that the program resulted in a somewhat higher inefficiency—\$30 million deadweight loss—in transferring income from taxpayers and consumers to producers.

**"Producer and Consumer Welfare Effects of Minimum Quality Standards: An Application to the Florida Fresh Grapefruit Market." James A. Zellner, University of Florida.**

A variation of pure repackaging demand was used to incorporate quality into a utility function. Consumers could (self) insure over time against variation in quality of a risky product bundle containing high and low qual-

ity units. Response to quality change depends on price elasticity of the risky bundle, and the relative value consumers place on high and low quality units in the bundle. A hypothetical increase in the minimum quality standard for internal (unknown prior to consumption) characteristics of early season Florida fresh grapefruit results in increased consumer and producer welfare.

**"Allocative Efficiency and Public Input Provision: The Case of Agricultural 'Check-Off' Programs." Robert E. Martin, Thomas P. Zacharias, and Mark D. Lange, Louisiana State University.**

Institutional arrangements for provision of public inputs can be found in several industries. An interesting arrangement is the "check-off" program in agriculture, where farmers choose the tax rate that supports production of the public input. They may also receive a refund of taxes paid in a prior period. This paper evaluates the allocative efficiency of various "check-off" programs. We find that the "check-off" program is not allocatively efficient and suggest a regulatory structure that leads to the social optimum output and input mix. The model also has implications for public input problems outside of agriculture.

## **FARM MANAGEMENT: LIVESTOCK AND FORAGE DECISIONS (G. A. Benson, North Carolina State University)**

**"An Analysis of Voluntary Dairy Supply Control Programs: Milk Diversion and Dairy Termination Program Participants." Wayne M. Gauthier, Robert B. Wharton, and Robin K. Reichers, Louisiana State University.**

Linear discriminant analysis (LDA) was used to evaluate characteristics which would allow one to distinguish Louisiana Milk Diversion Program (MDP) from Dairy Termination Program (DTP) participants. Nine variables for 74 MDP and 37 DTP participants were analyzed. Findings suggest that dairy farmers with large marketings are most strongly associated with the short-run MDP while dairy farmers with large numbers of cows and heifers are associated with the long-run DTP group. Models containing these two variables had relatively high rates of correct classifications whereas the absence of either variable



resulted in models which could not correctly classify.

**"Evaluating Lean Beef Production on Georgia Beef Pasture Systems Under Price and Yield Uncertainty."** James A. Duffield and Bill R. Miller, University of Georgia.

A risk programming model has been developed to compare production strategies for beef pasture systems in Georgia. Expected prices were estimated with an integrated moving average model of order two. Forage yields were measured from an experimental pasture system established at Eatonton, Georgia Agriculture Experiment Station. Results suggest that there is economic potential of expanding the use of forage beyond the typical cow-calf operation and carrying some steers to higher weights. The beef pasture model preferred grain finishing over grass finishing unless lean beef was given a twenty one percent price premium.

**"Economic Evaluation of Hay Inventory Alternatives in a Stochastic Dynamic Framework."** L. Garoian, J. W. Mjelde, and J. R. Conner, Texas A&M University.

An optimal policy for managing hay inventories is developed using dynamic programming for a research ranch in south Texas which produces hay and beef cattle. The policy integrates available grazing, intertemporal weather based production possibilities for grazing and hay, uncertain hay prices, and dynamic forage demand. Results indicate that hay should never be purchased to add to inventory. The optimal policy indicates that hay sales should be increased (inventories reduced) as hay prices and inventories increase and/or range conditions improve. Monthly effects indicate that inventories should be largest in July and January after harvest in May and October and prior to the typically high demand months of February, March, and August.

**"Optimal Forage Allocation Among Livestock and Wildlife Enterprises."** Michael K. Glover and J. Richard Conner, Texas A&M University.

Estimated seasonal forage production on three typical ranches in the Edwards Plateau region of Texas are used in conjunction with estimated seasonal forage intake by cattle, sheep, angora goats, and white-tailed deer in a linear programming model to maximize prof-

its. Lease-hunting of deer was included as an enterprise. Optimal livestock enterprise mixes were generated under two levels of output prices while including one of three different types of leasing operations. Results indicate that lease-hunting is important for generating income and that optimal enterprise mix and type of hunting lease are sensitive to range condition.

## **RURAL COMMUNITY DEVELOPMENT** (G. A. Doekson, Oklahoma State University)

**"Impacts of Alternative Farm Policies on Rural Communities."** James M. Bowker, James W. Richardson, Edward G. Smith, and Ronald D. Knutson, Texas A&M University.

The impacts of farm policy on rural communities have not been thoroughly studied. The purpose of this paper is to describe the Rural Agricultural Policy Simulation Model (RAPSIM) and demonstrate how it can be used to evaluate alternative farm policies on a rural economy. Decreasing target prices 10% or implementing the Harkin Bill would have major impacts on an agriculturally dependent rural economy. Declines (increases) in net farm incomes are translated to lower (higher) household purchases from retail and services sectors. The results refute claims that rural America has become sufficiently nonrural so that agricultural policy is not important.

**"Input-Output Analysis of Southeastern Agricultural Exports."** C. Parr Rosson and Helene Motard, Clemson University.

A microcomputer input-output model of the southeastern economy was developed to estimate the impact of agricultural exports on economic output, income, and employment. Over \$1.0 billion in economic activity has been generated annually by southeastern farm exports since 1978. Almost \$300 million in earned income and 23,000 jobs can be attributed to these exports. Tobacco, wheat, soybeans, and wood products are among the top income-producing exports.

**"Some Impacts of the Farm Financial Crisis on Two Agricultural Counties in Southwest Georgia."** Jefferson M. Green and James O. Wise, University of Georgia.

This study used secondary and survey data to analyze the effects of the farm crisis on the farm and non-farm economy of two rural counties. Farms were more adversely affected than the non-farm sector. The exception was entities supplying financing and inputs to farmers, especially the Farmers Home Administration and farm supply and equipment firms. Opportunities to expand the non-farm sector are limited and relate primarily to further processing of local farm products.

**“Basic Income Multipliers in Nonmetropolitan U.S. Counties.” Scott Sanford, U.S.D.A.**

Recent changes in the structure of both the national and local economy have given rise to concern about future levels of development and personal income. At the national level, there is a shift from industrial to service-oriented employment and from traditionally higher-income jobs to lower-income jobs. At the local level, there have been downturns in the agriculture and mining industries. In economies which exhibit dependence of service-oriented income upon basic income these trends may be particularly troublesome. Economic base models and basic income multipliers suggest local economies may be less severely affected than previously thought.

**“Asymmetry of Employment Multipliers in Recession and Expansion Periods in Rural Counties of Kentucky.” Chandra M. Shrestha, University of Kentucky.**

The objective of this study was to generate information on the characteristics of employment multipliers during periods of contrasting economic conditions. Using the economic-base regression approach, incremental (first-difference) employment multipliers were estimated from data for 112 rural Kentucky counties. Results generally corroborated the hypothesis that employment multipliers were lower in recessionary than in non-recessionary or growth periods. The results also indicated that the magnitude of the response of total employment to changes in basic-sector employment increased with increases in the lengths of run available for adjustment.

**FIELD MANAGEMENT:  
CONSERVATION AND POLLUTION  
CONTROL (T. H. Foster, TVA)**

**“Nutrient Application Rates Under Uncertainty: Some Implications for Public Policy.” William T. McSweeney and James S. Shortle, Pennsylvania State University.**

High rates of commercial fertilizer application in addition to heavy manure applications on cropland in Lancaster County, Pennsylvania, have been identified as an important cause of the degradation of the Chesapeake Bay. This study examines the farm-level nutrient management problem from the perspective of a risk-averse farmer coping with two key uncertainties: crop yield response to nitrogen applications and the nitrogen content of manure. Policy prescriptions for achieving nutrient balance are examined. The results suggest that current policy efforts may not be successful in effecting a socially desirable change in farm-level nutrient management.

**“Economic Analysis of Agricultural Nonpoint Pollution Control Alternatives: An Illinois Example.” Parveen Setia and Richard Magleby, U.S.D.A.**

Hydrologic and economic models are used to analyze the costs and effectiveness of implementing best management practice in a watershed under the Rural Clean Water Program in southwestern Illinois. Also evaluated were economic benefits and costs to water users and participating farmers. Results show that the cost effectiveness of the implemented practices in achieving water quality could have been improved by promoting the adoption of conservation tillage and certain crop rotations on all cropland in the watershed.

**“Economic and Financial Feasibility Analysis of Tillage System Options in Kentucky.” Richard L. Trimble and Jill M. Wade, University of Kentucky.**

This paper examines the economic potential and financial feasibility of three crop production tillage systems in Kentucky. The analysis uses a 400 acre case farm to investigate the profitability of each tillage system and the financial feasibility of adopting conservation tillage methods under various yield and production cost scenarios. In the majority of situations investigated, the conservation tillage systems were found to be the most profitable. However, the study also found that

**"Laser Beam Land Leveling of Rice Fields in Northeast Louisiana." Brian A. McManus, Louisiana State University.**

Laser leveling of rice fields has increased in recent years. Leveling fields benefits the farmer through more uniform irrigation, improved drainage, and increased yields. Costs of leveling were estimated followed by an estimate of costs and returns for leveled rice fields. The investment in laser leveling was analyzed using payback periods and net present value methods. At higher yields and greater leveled acreages, laser leveling could be a profitable investment.

**"A Theoretical and Programming Analysis of Expectational Errors." Ebenezer F. Kolajo and Neil R. Martin, Jr., Auburn University.**

As uncertainty shortens the time horizon over which future plans may be predetermined, farmers' decisions are often associated with expectational errors. From a theoretical standpoint, the cost of expectational errors is expressed in terms of elasticity of production, expected total revenue, total cost, and percentage change in input utilization. Empirically, however, the extent of expectational errors associated with production decisions of a North Alabama crop farm over an eight-year period is evaluated using mathematical programming approaches. The main conclusion is essentially methodological.

**COMPUTER DECISION AIDS AND EXTENSION INFORMATION (J. L. Jordan, University of Georgia)**

**"A Comparison of Farm L.P. to Alternative Microcomputerized Linear Programming Packages." James L. Novak, Auburn University; and Christopher McIntosh and M. Edward Rister, Texas A&M University.**

Farm L.P. provides a user friendly alternative to existing microcomputerized linear programming packages. While the concept of linear programming is fairly simple, the mechanics of structuring a problem in the programming format are fairly difficult for the untrained user. Farm L.P. is designed to overcome this difficulty by structuring two farm matrices and by providing interactive data entry routines. Comparisons are made between the program construction and data entry approach used by Farm L.P. and alternative ap-

proaches used by MPS-PC(c), LP-88(c), and DHLP. Finally, the results of an example farm plan generated using the alternative packages are contrasted.

**"COTFLEX: A Farm-Level Expert Simulation System to Aid Farmers in Purchasing Multi-Peril Crop Insurance." Gary L. Helms, James W. Richardson, and M. Edward Rister, Texas A&M University.**

A farm-level expert simulation system for a cotton farm, COTFLEX, has been developed. One major component, CIRMAN, is described. CIRMAN (Crop Insurance Risk-Management Analyzer) provides advice regarding purchasing multi-peril insurance on a whole-farm basis. Its description and application are demonstrated on a hypothetical Southern Blacklands farm in Texas.

**"The Texas Agricultural Financial Analysis Expert Systems: Its Development and Capabilities." James M. McGrann and Timothy Powell, Texas A&M University.**

This paper describes an agricultural financial analysis expert system developed to facilitate more effective use of accounting and financial statement information. The diagnostic tool can be used by lenders or producers to complement expertise. The expert systems were developed through a cooperative effort of the Texas Agricultural Experiment Station, the Farm Credit Bank of Texas, and private software vendors.

**"The Market for Extension Information in Virginia." G. W. Warmann and Patricia Rice, Virginia Polytechnic Institute.**

A survey of 334 randomly selected Virginia farmers indicates their reading habits and informational needs. Farmers use a variety of information sources, not limited to in-state institutions. Needs of farmers and their reading habits suggest means for the state Extension Service to reach and serve these clientele.

**VALUATION OF PUBLIC SERVICES AND LAND VALUES (L. J. Guedry, Louisiana State University)**

**"Valuation of Deer-Hunting Within a Household Production Framework." John MacKenzie, University of Delaware.**

An econometric model relating deer-

hunters' expenditures and time commitments as inputs to hunting success is formulated from household production theory and tested against data from a mail survey of Delaware hunters. Empirical results indicate that hunting success and commitment of time and money to hunting are mutually reinforcing. The results suggest a multiplier effect for game management: aggregate hunting expenditures can be expected to increase significantly as management enhances probability of hunter success.

**"Microdata Comparisons of Marine Recreational Fishing Site Benefit Estimation with Direct and Indirect Methods." M. Walter Milon and Carolyn M. Fonyo, University of Florida.**

With the growing popularity of marine recreational fishing, there has been considerable interest in the use of artificial marine habitats to maintain and enhance coastal fishery stocks. This paper addresses the issue of use benefit estimation for new habitat development using contingent valuation and travel cost methods. In addition, the paper provides an evaluation of previous research directed to concerns about the comparability of these direct and indirect valuation methods and provides new empirical evidence using individual data. The results indicate a closer correspondence between the two methods than identified in previous studies. But, the use of individual data raises some difficult questions about appropriate indicators of benefit measures for the user population.

**"Consumer-Use Valuation of the University of Tennessee Arboretum." Mark Downing and Roland K. Roberts, Texas A&M University.**

Many studies have estimated demand functions for visits to recreation sites. Several included commonly defined recreation-based areas such as beaches, parks, lakes, and rivers, but horticulturally significant sites such as botanic gardens and arboreta have not been examined. This study estimates user demand and consumer surplus for visits to the University of Tennessee Arboretum by the travel cost method using maximum likelihood estimation techniques. Results suggest that travel cost and income of consumers are important determinants of demand, at least in the case of visits to the University of Tennessee Arboretum. Consumer-use value is

estimated to be \$0.53 per person.

**"The Rural Land Market in the Fifth Farm Credit District." John L. Adrian, Jr., Lee A. Benoist, and William E. Hardy, Jr., Auburn University.**

Data for the Fifth Farm Credit District for the period 1976-77 are analyzed to determine structural characteristics of land markets for the District and each component state (Alabama, Louisiana, and Mississippi). Estimated models which include such variables as size of tract, percent of tract in cultivation or pasture, primary enterprise produced, presence of irrigation, quality of farm security, degree of nonfarm type influence, time, distance to a metropolitan area, and soil type explain approximately 50 percent of the variation in per acre bare land values. Structural quality of the models is good with most variables being significant and having correct hypothesized signs. Land values were found to show significant variation over the period of analysis; however, the Alabama market evidenced the only significant "bottoming-out" in values.

**CATTLE MARKETS (A. R. Schupp, Louisiana State University)**

**"Price Asymmetry in Spatial Fed Cattle Markets." Deevon Bailey, Utah State University; and B. Wade Brorsen, Purdue University.**

Price asymmetry in spatial fed cattle markets is investigated for three large markets (Amarillo, Omaha, and Colorado) and one small market (Utah). Little evidence is found to support the notion that equilibrium prices for fed cattle are asymmetric between locations. But, evidence did suggest that adjustments to price increases occur more quickly than adjustments to price decreases. This may occur from producers withholding cattle from the market when prices decrease.

**"Leading Indicators and Price Linkages Between Wholesale Beef and Fed Cattle Prices." C. Jane Owen, Thomas L. Sporleder, and David Bessler, Texas A&M University.**

Vertical linkages are investigated among fabricated cut prices, carcass value, and fed cattle prices. Also, the linkages between slaughter cattle and wholesale beef are deter-

mined by using both simple linear regression and vector autoregression (VAR) techniques. Results, using daily prices over the 1980-1985 period, suggest that imputed carcass value (IVC) is a better leading indicator for inferring fed cattle prices than is the USDA reported carcass quote. The VAR analyses indicate that fabricated cut prices and cattle prices are related to the ICV, carcass quote, and fed cattle prices. In addition, three boxed beef cuts are dominant as leading indicators. They are strip loin, bottom and top round prices. VAR models out-performed the univariate and random walk models in forecasting ability.

**"An Economic Analysis of Alternative Pricing Methods for Alabama Stocker Cattle Producers."** John C. McKissick, Neil R. Martin, Jr., and Ebenezer F. Kolajo, Auburn University.

Educational efforts in the area of marketing have primarily focused on how to use pricing methods rather than on how to make pricing decisions. This study examines practical pricing strategies which stocker operators could use for managing price risk. A total of 151 pricing strategies were identified and analyzed, using the target MOTAD model. Each strategy combines the pricing methods and indicators currently available for use by Alabama cattlemen. Forward pricing strategies were found to be superior to the cash market alternative currently used by most cattlemen, when evaluated in terms of returns generated above costs.

**"Price Differentials in Kansas Feeder Cattle Auction Markets."** Ted Schroeder, James Mintert, Frank Brazle, and Orlen Grunewald, Kansas State University.

Feeder cattle prices are determined by the interaction of many factors. This study uses 1986 and 1987 Kansas feeder cattle auction data to investigate the impact a wide variety of physical characteristics have on feeder cattle prices. Unlike previous studies, this analysis explicitly incorporated changes in feeder cattle market fundamentals during the data collection period and also allowed price differentials to vary by sex and weight. Weight, weight squared, lot size, lot size squared, health, muscling, frame size, condition, fill, breed, presence of horns, and time of sale were significant factors affecting feeder

cattle prices. Several physical traits exhibited seasonal price impacts.

## **FRUIT AND VEGETABLE MARKETS (E. A. Estes, North Carolina State University)**

**"An Analysis of Pricing and Market Structure in the Florida Celery Industry."** Timothy G. Taylor and Richard L. Kilmer, University of Florida.

The pricing behavior of the Florida celery industry under the current federal marketing order is examined by analyzing the implied market structure of the industry using the model proposed by Applebaum. The empirical results suggest that some degree of price enhancement above that which would be characterized by a perfectly competitive market may have occurred. However, the hypothesis that the structure of the Florida celery industry is characterized by perfect competition is rejected.

**"Responses to Mail Surveys: A Modified Total Design Method."** David B. Eastwood, John R. Brooker, and Robert H. Orr, University of Tennessee.

The total design method is suggested as a way of increasing mail survey responses. However, little research has been published regarding the effects of follow-ups on the characteristics of the sample or on the distribution of responses to attitudinal questions. Results of the application of a modified total design method indicate that neither the characteristics of the sample nor the distribution of attitude responses change by follow-up. The gain from mail surveys which use first class mail alone may be primarily related to increased sample size due to higher response rates.

**"Using USDA Fresh Fruit and Vegetable Arrivals to Determine the Distribution of a State's Production."** Richard Beilock and Kenneth Portier, University of Florida.

To determine the distribution of a state's produce production across regions of the U.S. and Canada, it has been common to equate this with the distribution indicated by USDA Arrivals data. In this paper an indirect method is proposed that relies on the Arrivals data only for market share information. The empirical results are encouraging.

**"Generating Information for Pecan Producers in a Thin Market Environment."** Stanley M. Fletcher and Wojciech J. Florkowski, University of Georgia.

The pecan market is a thin market and growers suffer from an insufficient amount of market information. In order to provide more information, pecan demand elasticities and demand elasticities for other nuts were calculated. In addition, a regional price forecasting model was applied for estimation of probabilities concerning the next year pecan price.

**"Perspectives on Apple Handling by Metropolitan Market and Apple Source."** Jeffrey Beaulieu, Southern Illinois University.

The requirements of apple handlers are shaped both by market served and the production area from which the handler is supplied. Responses to a questionnaire indicate that although handlers are more apt to have similar preferences, differences concerning shipment requirement, quality preferences, and responses to price discounts are related to market served and apple source.

#### **ADVERTISING AND PRODUCT DIFFERENTIATION (R. A. Schrimper, North Carolina State University)**

**"Advertising and the Demand for Fruit Juices: A Household Production Theory Approach."** Jonq-Ying Lee and Robert M. Behr, University of Florida.

The traditional household production approach was used to study the shadow prices for advertising expenditures in the three major juice categories. Results indicate that two of the shadow prices are significantly greater than zero implying that the household incurs costs in response to changes in juice advertising activities. Further, the cost function that generates the shadow prices appears plausible in terms of its elasticities of substitution and factor demand.

**"Effectiveness of Fluid Milk Advertising by the National Dairy Board."** Ronald W. Ward, University of Florida; and Bruce L. Dixon, University of Arkansas.

An econometric model using monthly time series cross sectional data is estimated to measure the impact of fluid milk generic advertising expenditures by the National Dairy

Promotion and Research Board which has been active since September 1984. The estimated model shows that the elasticity of advertising has increased. Gains in fluid milk sales attributed to advertising are estimated. These gains are apportioned between regional and Board advertising efforts to identify the Board's net impact on fluid milk sales. The model measures potential demand shifts during the first and second years of the Board's activities.

**"Differentiating Vidalia Onions to Preserve Growers' Price Premium."** Terence J. Centner, Steven C. Turner, and John T. Bryan, University of Georgia.

The market for Georgia's Vidalia Onions is threatened because of the absence of quality control measures regarding the product sold under this appellation. This paper reports findings from a price analysis which disclosed that Vidalia Onions sell for a premium price. Following a discussion of product differentiation, the institutional devices for product differentiation are identified. The issues of use of name by others, quality control standards, and free riders are discussed to discern how Georgia growers can employ institutional devices to protect their premium product.

#### **COMMODITY SECTOR ANALYSIS (L. Davis, Southern University)**

**"Grain Storage as a Market Oriented Policy."** Robert D. Reinsel, U.S.D.A.

The role of a government grain storage program in a market determined price economy is examined. Nonmarket forces are examined as they affect storage decisions. Reactive yield triggered storage programs are presented as a means of allowing market determined pricing while reducing variability due to non-market forces.

**"Testing for Causal Influences on International Soybean Prices."** Scott Reynolds and Carlos Arnade, U.S.D.A.

This paper uses several bivariate causality tests to determine U.S. influence on international soybean prices. It tests if U.S. exports and/or U.S. soybean prices cause world soybean prices. The results are related to a theory of how markets transmit prices.

**"Supply Response Analysis for Double-Cropping Soybeans and Wheat Acreages in the Southeast."** Kamil H. Shideed and Fred C. White, University of Georgia.

A supply response model based on inter-related production decisions was specified to quantify the interdependence between wheat and soybean planting decisions as they are affected by various market and policy forces. This study suggests that wheat and soybean double-cropped acreages be simultaneously analyzed to account for their joint determination. An empirical application of the model to the Southeast yielded results that were consistent with the theoretical model and provided elasticity estimates with important implications for policymakers.

**"The Contribution of Farm Programs to Structural Changes of Corn Supply Response in Georgia."** Fred C. White, Kamil H. Shideed, Stephen J. Brannen, and Robert S. Glover, University of Georgia.

Both acreage and yield supply response need to be accounted for in modeling the responsiveness of farm production to changes in prices and policies. In this study of corn production in Georgia, the responsiveness of corn production to price is determined by the acreage elasticity with respect to price of 0.38, the yield elasticity with respect to price of 0.22, and the yield elasticity with respect to acreage of -0.60. Thus, approximating the production elasticity by the acreage elasticity alone would not result in reliable policy implications. Other results indicated that the target price/deficiency payment program has increased the responsiveness of Georgia farmers to price changes.

**"An Empirical Examination of the Dynamic Relationships within the U.S. Dairy Sector."** Kimberly L. Haden and Larry W. Vantassell, University of Tennessee.

Numerous studies have econometrically analyzed the dairy sector and effects of alternative dairy policies. While many of these studies have included dynamic aspects, often strict *a priori* assumptions have been made concerning which variables enter each equation and the lag length or the structure of the lags. Vector autoregression is a dynamic multiequation technique which places few *a priori* restrictions on the system of relationships.

This study attempts to analyze several of the dynamic relationships in the dairy sector utilizing a vector autoregression.

**FARM MANAGEMENT;  
IRRIGATION AND CROPPING  
DECISIONS** (L. Bauer,  
Clemson University)

**"Risk Efficient Cropping Strategies and Farm Survival: Texas Trans-Pecos."** John R. Ellis, Washington State University; and Ronald D. Lacewell, Jaroy Moore and James W. Richardson, Texas A&M University.

Biophysical and farm firm simulation were used to examine the impacts of declining target prices on highly leveraged producers in the Texas Trans-Pecos. Generalized stochastic dominance analysis was used to narrow the field of irrigation schemes considered. Multiple whole-farm simulations over a 5-year period (1987-1991) predicted continuing declines in net worth, poor chances of economic success, and moderate chances of firm survival. As target prices declined, crop selection tended toward the more water-intensive cotton irrigation schemes. Limited water supplies resulted in the choice of a combination of irrigation schemes including some deemed relatively inferior using stochastic dominance techniques.

**"Procedures for Evaluating Income and Stability of Income from Investment in Supplemental Irrigation."** Lonnie R. Vandever, Kenneth W. Paxton, and David R. Lavergne, Louisiana State University.

Supplemental irrigation represents a production technology that may be used to modify the risk-return position of a farm business. A safety-first model is used as a basis for evaluating supplemental irrigation of cotton and soybeans in the Macon Ridge area of Louisiana. The results of the application suggest that supplemental irrigation of soybeans does not substantially improve income stability on a representative farm while supplemental irrigation of cotton does improve income stability and the ability of the farm to meet its fixed obligations.

**"Evaluating the Impact of Limited Agricultural Water Use on the Net Return and Cropping Pattern in a Louisiana Parish."** Hugo Cardona-Castill and Steven A. Henning, Louisiana State University.

Producers in southern states with access to seemingly abundant quantities of ground and surface water have recently shown increasing interest in supplemental crop irrigation. This study integrates information on water requirements of plants, soil productivity, and cost of production in a linear programming model which evaluates the impact of limited agricultural water use on net return to production and traditional cropping patterns in a county. Results from the study indicate that under conditions of limited agricultural water use, traditional cropping patterns may not optimize net return. The cropping pattern may also shift among soils as water use becomes more restrictive.

**"Laser Beam Land Leveling of Rice Fields in Northeast Louisiana." Brian A. McManus, Louisiana State University.**

Laser leveling of rice fields has increased in recent years. Leveling fields benefits the farmer through more uniform irrigation, improved drainage, and increased yields. Costs of leveling were estimated followed by an estimate of costs and returns for leveled rice

fields. The investment in laser leveling was analyzed using payback periods and net present value methods. At higher yields and greater leveled acreages, laser leveling could be a profitable investment.

**"A Theoretical and Programming Analysis of Expectational Errors." Ebenezer F. Kolajo and Neil R. Martin, Jr., Auburn University.**

As uncertainty shortens the time horizon over which future plans may be predetermined, farmers' decisions are often associated with expectational errors. From a theoretical standpoint, the cost of expectational errors is expressed in terms of elasticity of production, expected total revenue, total cost, and percentage change in input utilization. Empirically, however, the extent of expectational errors associated with production decisions of a North Alabama crop farm over an eight-year period is evaluated using mathematical programming approaches. The main conclusion is essentially methodological.