Economics of Recirculating System Aquaculture in the Northeast

Organizer & Moderator: Gregory Hanson (The Pennsylvania State University)

"The Feasibility of The Freshwater Institute Recirculating System." B. Gempesaw (University of Delaware), "Costs and Returns with a Small-Scale System in Central Pennsylvania." G. Hanson (The Pennsylvania State University), "Niche Marketing of Recirculating System Aquaculture Products in the Northeast." G. Rauniyar (The Pennsylvania State University), "General Marketing Issues for Aquaculture in the Northeast." A. Manalo (University of Maine) Bobby Gempesaw presented the financial results of his analysis of a large scale trout production system in West Virginia. The financial detail of a model, including loan deferral options was illustrated. The high capital cost of the system resulted in breakeven per period prices more than twice as large as current market prices. Greg Hanson discussed the economics of a small scale system producing tilapia. The asset turnover ratio of this system, with $10,000 annual sales, is one-to-one, indicating a rapid rate of capital recovery. Positive and negative factors, such as freshness, safety and control of the complete system, versus inadequate scale of production, and waste disposal were discussed. Ganesh Rauniyar found that both demographic and sensory perception variables contributed to the development of consumer profiles. Nutrition and 'expensiveness' were particularly important factors in consumers' decisions to purchase seafood. Alberto Manalo cited the benefits of restaurant consumption of seafood in terms of popularizing future home consumption of fish products. The importance of introducing seafood to younger consumers was cited.

Resource Characteristics and Financial Performance of Northern US Dairy Farms: Why are the Ranges So Great?

Organizer: Robert Yonkers (The Pennsylvania State University)
Moderator: Wayne Knoblauch (The Cornell University)
Presenters: Kevin Jack (Cornell University), Robert Yonkers (The Pennsylvania State University), Robert Gardner (Michigan State University)

This symposium focused on relationships among farm resource characteristics and financial performance measures as a method of evaluating similarities and differences within and across states. The symposium participants are part of the Dairy Farms Analysis Project supported by Cornell University. Jack highlighted differences in farm characteristics between farms in the top and bottom quartiles by financial performance measures using New York farm-level for 1989. Using Pennsylvania farm-level data for both 1990 and 1991, Yonkers looked at both farm resources characteristics and financial performance for two farm size categories, 40- to 60-cow farms and 150- to 250-cow farms. Gardner used a pooled data set from New York, Pennsylvania and Michigan farm-level data for 1990 and 1991 to show differences across states for both 40- to 60-cow farm and 150- to 250-cow farm sizes. Audience discussion related to additional topics to analyze with this pooled data set, and issues related to methods of comparing diary farms within and across states and regions of the country, including the implications of such differences for policy analysis.

Component Pricing of Milk: Theory and Practice

Organizers: William J. Gillmeister and Robert Yonkers (The Pennsylvania State University)
Moderator: Robert Yonkers (The Pennsylvania State University)
Presenters: William J. Gillmeister (The Pennsylvania State University), David Walker (Federal Milk
Market Administrators Office, Middle Atlantic Marketing Area), James Sleper (Milk Marketing, Inc.)

Following a brief review of milk pricing over the past 75 years, each presenter discussed an aspect of changing to a component milk pricing system. Gillmeister presented data on the inefficiencies between implicit retail and explicit farm values of milk components, and discussed implications of resource misallocation by farm managers. Yonkers looked at the decision to support a change in milk pricing from the perspective of a milk marketing cooperative, especially as related to generating member support. Walker's view was from a regulatory agency charged with enforcing administrative pricing of milk which adopted component milk pricing in January 1992. Walker emphasized that the change in milk pricing did not affect total revenue paid by milk handlers to dairy producers, but noted that how revenue was distributed did change. Especially noteworthy was that nearly 70 percent of small dairy producers (less than 600 cwts of milk marketed per month) received less revenue under component pricing, while about the same percent of large dairy producers (more than 1,200 cwts of milk marketed per month) saw increased revenue. Audience discussion focused on acceptance of new component pricing systems by all parties in the marketing channels and technical factors relating to adoption of such a pricing system.

Abstracts of Selected Papers

Production and Investment under Risk or Uncertainty

(Chair: Tim Phipps, West Virginia University)
"Investment Demand When Physical Depreciation is Stochastic." Panos Fousekis and James Shortle (The Pennsylvania State University)

A topic of long interest in production economics is optimal investment by the firm. A standard assumption in models of investment behavior is that asset accumulation is deterministic. However, while the rate of investment is deterministic for the firm, the rate of depreciation is not. Physical and economic depreciation are subject to some uncertainty. This paper presents a model of capital accumulation by a competitive firm in which depreciation follows a stochastic process. The implications for investment rules and capital stock are explored. It is shown that a stochastic rate of depreciation decreases both investment and expected capital stock, at the steady state.

"A Multiple Output Risk-Return Analysis of Poultry, Corn, Soybean and Trout Production." C.M. Gempesaw II, J.R. Bacon, I. Supitaningsih (University of Delaware) and J. Hankins (The Freshwater Institute)

A comprehensive, farm-level, stochastic and dynamic, capital budgeting simulation model, AQUASIM, is used to evaluate the economic benefits of incorporating a small scale trout enterprise with a grain and broiler farm. The simulation results indicate that combining aquaculture production with traditional agriculture increased expected income and reduced risk substantially. The use of external debt capital improved the after-tax net present values and internal rates of return but lowered net cash farm income. This study shows the importance of enterprise diversification in stabilizing variability in expected income.

"Selection of Peach Rootstocks Under Risk." Jayson K. Harper and George M. Greene II (The Pennsylvania State University)

Thirteen peach rootstocks were evaluated for acceptance by fruit producers with different attitudes towards risk. In terms of average net returns, Halford, own-rooted 'Redhaven', Bailey, and Lovell appear to be good rootstock choices. In most cases, however, variability increases as net returns increase. Using stochastic dominance with respect to a function technique, Halford, own-rooted 'Redhaven', and Bailey were ranked consistently in the top three across all risk intervals.

"Risk and Return Considerations in Farm-Level Strategic Planning." Rhonda Aull Hyde (University of Delaware) and Solomon Tadesse (University of Maryland)

Decision support systems are generally geared to short-term tactical decision making. As an alternative, this paper develops a mathematical programming model to evaluate long-term strategic alternatives in the context of farm-level agricultural production where a broiler farm considers long-term implications of diversification into commercial aquaculture. The model considers a ten-year strategic planning horizon, incorporates financial risk and return considerations, and accommodates capacity variations. Results indicate that a diversification strategy significantly increases farm profitability while simultaneously maintaining financial risk below a predetermined tolerance level and return on investment above a predetermined level.

Novel Issues in Modelling Public Preferences with Contingent or Experimental Methods

(Chair: Lois Willet, Cornell University)
"Using Ethnographic Methodology in Focus Groups to Improve Contingent Valuation: An Introduction to Theory and Application." Robert J. Johnston, Thomas F. Weaver, Lynn A. Smith and Stephen K. Swallow (University of Rhode Island)

Focus groups are small discussion groups with potential survey respondents, used increasingly in the design of contingent valuation surveys. Ethnographic interview techniques, borrowed from anthropology, may improve focus groups as a reliable method to learn how respondents perceive natural resources. Ethnographic techniques reveal a less biased picture of decision fields which are relevant to the respondent, and better prepare the researcher to construct survey questions which will be interpreted as intended. This paper describes ethnographic methodology and its integration into focus groups. It introduces the theoretical foundation of the ethnographic approach, and describes its use and benefits in survey design. It also describes the application of ethnographic techniques to modeling public preferences for watershed management.

"Methods for Improving the Design and Structure of Contingent Valuation Questionnaires." David R. Walker and John P. Hoehn (Michigan State University)

Contingent valuation questionnaires need to be designed to communicate effectively between the researcher and respondent. A mail survey of authors of contingent valuation articles found that more can be done to test and improve researcher-to-respondent communication. Focus groups, one-on-one pretesting and debriefing, verbal protocol analysis, and survey pretesting are examined as methods for testing communication and effectiveness.

"An Experiment in Contingent Valuation and Social Desirability." Andrew S. Laughland, W.N. Musser (The Pennsylvania State University) and Lynn M. Musser (Purdue University)

Social desirability (SD) represents the problem of subjects responding with social norms rather than individual values. This paper briefly surveys the SD literature and considers its relevance for contingent valuation (CV) studies. In an empirical study undergraduate students were administered the Marlowe-Crown Social Desirability Scale, as well as CV questions. High SD scores were hypothesized to imply a greater likelihood of offering a protest reason for a zero bid and to increase bids for socially desirable commodities. While all hypotheses were not supported, the empirical results suggest that SD can influence CV responses and should not be dismissed prematurely.

"Economics of Restoration and Natural Resource Damage Assessment." M.J. Mazzotta, J.J. Opaluch and T.A. Grigalunas (University of Rhode Island)

To date, the focus of damage assessment has tended to be either on economic valuation of lost services in monetary terms or on scientific studies of resource restoration. This paper suggests an alternative approach that integrates legal concepts based on the public trust doctrine, economic methods of determining compensation, and scientific approaches to restoration. The approach is based on a definition of restoration as "resource compensation"—a remedy for oil spill damages wherein alternative restoration actions are identified that provide resource services that are "equally desirable" to society as those lost due to the spill. The least costly of these alternatives is then selected as the cost effective means of making the public whole.

Dairy Production, Pricing and Marketing

(Chair: Daniel Lass, University of Massachusetts)
"The Impacts of Unaided Advertising Recall on Product Beliefs and Milk Consumption." John E. Lenz and Heiko Miles (Cornell University)

In this study we incorporate Ajzen and Fishbein's "Theory of Reasoned Action" into a neoclassical economic demand model. Using telephone survey data, we find that the effect of advertising, as measured by unaided TV advertising recall, alters respondents' salient product beliefs and has a significant positive influence on milk consumption.

"The Effect of Selected Characteristics on Dairy Farm Profitability: A Logistical Regression Analysis." K.E. Jack (Cornell University)

The cost, efficiency, technical and locational factors influencing dairy farm financial success were analyzed using records from 384 specialized New York dairy farms. Logistic regression models were constructed for the following size-neutral financial performance variables: net farm income per cow; labor and management income per cow; percentage return on equity; and, percentage return on investment. Milk sold per cow, machinery and feed expense, hired labor expense, mailbox milk price, and percentage of total farm receipts from dairy were the most consistently important explanatory variables. The herd size variable was inconsistent, statistically significant in only two of the four models.

"Cost Efficiency in Milk Production in the United States: A Growth Accounting Approach." Horacio Cocchi and Boris E. Bravo-Ureta (University of Connecticut)

Cost efficiency indexes were derived over time, states, and farm sizes using dairy farm data for Michigan, Vermont, Pennsylvania, Maine, Connecticut, and New York for the period 1968-1988. Technological change yielded an average annual rate of cost reduction of 1.6% over the period studied. In addition, cost efficiency was found to increase with farm size. Michigan and Pennsylvania

had a distinct competitive advantage, while Maine exhibited a clear competitive disadvantage in producing milk relative to New York. Partial cost efficiency indexes showed that cows, labor and land were the major sources of per unit cost reductions over time and across states and farm size.

"The Relative Profitability of Jersey vs. Holstein Farms Under Alternative Milk Pricing Systems: An Application of Whole-Farm Simulation Modelling." A. Elbehri, Robert D. Yonkers, S.A. Ford and Sharon I. Gripp (The Pennsylvania State University)

The impacts on dairy farm economic performance of shifting from the current volume-butterfat differential pricing to component milk pricing were compared between Jersey and Holstein farms using simulation analysis. Results shown that Jersey farms would benefit substantially from component milk pricing, while Holstein farms would experience little impact.

Farmer Attributes and Attitudes and Effects on Public Policy

(Chair: Timothy Kelsey, The Pennsylvania State University)
" 'On Policy Direction' After the Farm Financial Crisis." Gregory D. Hanson (The Pennsylvania State University)

At the end of 1990 financial stress among commercial farmers was about 7 percent, and insolvency, about 1 percent. The farm financial crisis was over by 1990. Farmers now have the equity cushion to adapt to a market oriented farm bill based on CCC loans, with no deficiency payments, with farm bill monies diverted to export enhancements, new product development and conservation incentives. A loan loss model was used to assess the financial strength of farmers.

"Farmer Productivity at Various Ages." Loren W. Tauer (Cornell University)

The productivity of farmers at six different age cohorts was computed by estimating production function using 1987 census data. The results suggest that farmers of different ages operate with slightly different technologies and use various inputs at different efficiencies. Compared with previous 1978 estimates, the productivity of middle-aged farmers appears to be even greater than the productivity of younger and older farmers. The average age of U.S. farmers exceeds the age of highest productivity from these estimates.

"Attitudes and Agricultural Practices of Sustainable Farmers." James C. Hanson (University of Maryland), Charles S. Kauffman (Accokeek Foundation) and Anne Schauer (Rodale Institute Research Center)

In 1991 and 1992, 398 sustainable farmers were surveyed regarding their attitudes and agricultural practices in 14 states. The average farm size for the grain farmers was 475 acres, for the vegetable farmers, 53 acres. Over 80% of the surveyed grain farmers and vegetable farmers have reduced their use of inorganic fertilizer or do not use inorganic fertilizers. Over 85% of both groups have reduced herbicide use. Only small proportion of the grain farmers and vegetable farmers state that the elimination of inorganic fertilizer and herbicides is *not* a long term goal. Approximately 2/3 of the grain farmers thought that neither yields or profits had suffered after they had completed the transition to sustainable agriculture. One-half of the vegetable farmers thought that yields had not suffered, yet only 1/4 thought that profits had not suffered. Fifty percent of surveyed farmers think that there is a trend towards adoption of sustainable practices, but 50% think that 1/2 of their neighbors are skeptical or hostile towards the adoption of sustainable agriculture.

Reliability and Stability of Contingent Valuation

(Chair: John Mackenzie, University of Delaware)
"Reliability of Contingent Valuation Estimates." Donald J. Epp and Sharon I. Gripp (The Pennsylvania State University)

This study examines the reliability of CV estimates of a general population's willingness to pay for the protection of tropical rain forests. This subject was unfamiliar to most respondents. Of six measures of reliability examined, four gave indications of reliability. Two others provided weak support for a finding of reliability. Overall, we conclude that respondents gave similar answers to each round of the study and that there is evidence that the CV method is reliable even when applied to problems not familiar to most respondents.

"Stability of CVM Across Elicitation Procedures: Some Findings." J.M. Bowker and R.A. Souter (USDA, Southeast Forest Experiment Station, Athens, GA)

We examine the stability of the dichotomous choice and payment card CVM elicitation approaches in an assessment of annual individual economic surplus associated with lake recreation in the Whiskeytown-Shasta-Trinity National Recreation Area. With separate samples, we use Tobit regression to model the payment card responses and Logit regression for the dichotomous choice responses. Confidence intervals for the respective mean values are derived. Our findings indicate large and significant incongruence between the two elicitation approaches; the dichotomous choice mean being more than ten times larger than the payment card mean.

"Temporal Reliability of Dichotomous Choice Contingent Values: An Application of Full Panel Design." ("Test-retest Reliability of Dichotomous Choice Contingent Values: An Application of the Solomon Design") Mario F. Teisl (University of Maryland), Kevin J. Boyle (University of Maine), Daniel W. McCollum (Rocky Mountain Forest and Range Experiment Station) and Steven D. Reiling (University of Maine)

The standard methodology used to test for temporal reliability of contingent valuation has been the test-retest procedure. However, this methodology is limited because if the time period between the two surveys is relatively short, then the study may exhibit testing bias. Conversely, as the time period between the two surveys increases, there is an increased chance the true value of willingness-to-pay (WTP) will change. Reliable estimators should produce different estimates of WTP if the true value differs between two time periods. The meth-odology used in this study incorporates a full panel design. As a result, we can test whether temporal reliability exists even if the true value of WTP in time one is different from the true value in time two. By analyzing contingency and chi-square tables and using logit analysis, we determine the distributions of responses made by individuals in the test-retest group and the control group are the same in both time periods. These results strongly suggest dichotomous choice contingent valuation estimates are temporally reliable.

Assessment of Non-Human Inputs to Agricultural Production

(Chair: James Hanson, University of Maryland)
"A Partial Budget Analysis of the Pre-Sidedress Nitrogen Test." Kathleen Kreahling, Wesley N. Musser, James S. Shortle, Brian Roach, Wen Chi Huang, Douglas B. Beegle and Richard H. Fox (The Pennsylvania State University)

Increasing concern about the impact of agriculture on water pollution is focusing attention on management practices that could decrease pollution and increase farm profits. The pre-sidedress nitrogen test (PSNT) is a practice that has the potential to reduce nitrate pollution. This paper presents an

analysis of the impact of the test on farm profits and excess nitrogen applied to corn. Data from a survey of farmers and field tests are used to estimate effects of PSNT on nitrogen use. Partial bud- gets from these data include modest increases in profits while the analysis of excess nitrogen indicates a dramatic decrease.

"Selecting Cost Minimizing Herbicide Programs for Corn in Pennsylvania Using Integer Programming." J. Rolf Olsen, Jayson K. Harper, and William S. Curran (The Pennsylvania State University)

An integer programming model for herbicide selection was developed for corn production under Pennsylvania conditions. The model minimizes the cost of a herbicide program subject to a desired level of weed control. By selecting the weed species to be controlled and the level of control desired, customized herbicide program can be generated. The model can also be used to evaluate the cost of changing the level of control desired for an individual weed species or set of weeds.

"Temporal Aggregation of von Liebig Response Functions." Beth Pride Ford, Wen-Chi Huang, James Shortle, Wesley N. Musser and Richard H. Fox (The Pennsylvania State University)

Widespread use of the linear response and plateau (LRP) specification in estimating aggregate fertilizer response assumes that the von Liebig hypothesis holds at both plot and aggregate levels. When plots are temporally and/or spatially heterogeneous, aggregate response can be mathematically represented by a smooth concave function. This study estimates plot-level and aggregate response functions for Pennsylvania corn using LRP, polynomial, and expected yield specifications and tests whether or not aggregate fertilizer response can be represented by a smooth concave function. Results fail to reject the LRP specification in favor of the expected yield and polynomial specifications.

Environmental Aspects of Rural Living and Agricultural Competitiveness

(Chair: Farhed Shah, University of Connecticut)
"Rural Water Contamination in West Virginia: Household Response and Monetary Benefit from Contamination Reduction." Alan R. Collins (West Virginia University) and Scott Steinback (The National Marine Fisheries Service, Woods Hole, MA)

About one-third of all West Virginians obtain domestic water from private wells. Mail and telephone surveys were used to investigate household responses to bacteria, mineral, and organic chemical contamination of private water systems. Most rural households (86% of valid surveys) responded to water contamination with averting behavior to prevent exposure. The average, annual economic cost of averting behavior per household was $320 for bacteria, $357 for mineral, and $1,190 for organic chemical contamination. These economic costs represent a lower bound estimate for rural household willingness-to-pay for a reduction in water contamination. The economic costs from averting behavior were found to be higher than average monthly charges for rural, public water systems in West Virginia. Models were developed to predict household response decision and level of response as measured by monetary costs. Mineral contamination and well age had statistically significant coefficients for predicting response. In the response cost model, perceived health problems and organic contamination were important variables.

"Adoption of Environmentally Beneficial Agricultural Practices (EBAPs): What is the Role of Altruism?" R.D. Weaver (The Pennsylvania State University)

The usefulness of economic theories of adoption are assessed for the case where the decision maker may hold some form of altruistic values. A theory of adoption of conservation practices is presented and tested to evaluate the role of altruistic values vs. private pecuniary or hedonistic motivation. Re-

sults are presented for a multinomial logit and To-bit models of adoption of fertility management and conservation tillage practices by a sample of field crop farmers. Results confirm the role of altruistic values even in the presence of hedonistic motivation.

"The Effect of Environmental Restrictions on Interregional Competitiveness in U.S. Apple Markets."
Huei-wen Chang and James W. Dunn (The Pennsylvania State University)

An interregional competition model of the U.S. apple industry is developed. This model includes nine regions and three consumer product forms. The validation of the model suggested that it generally reflected actual market interactions. This model was then used to examine the effects of different restrictions in pesticide use within differ-ent adjustment periods. The impacts of restrictions of EBDCs on each production region were differ-ent. Western growers gained from the problems in the East. Overall, the distribution patterns were more sensitive than trade volume. Consumers had to pay more and consume less.

Amenity Benefits from Agricultural Land And Open Space Preservation Programs

(Chair: Alan Collins, West Virginia University)
"Amenity Benefits and Government Intervention: An Application to the Connecticut Dairy Sector."
Marilyn A. Altobello, Rigoberto A. Lopez, Farhed A. Shah (University of Connecticut)

Population and economic growth in many areas have resulted in conversion of agricultural land to urban uses. Since remaining farmland often yields amenity benefits that may not be fully internalized in land markets, government intervention may be justified to improve land allocation. This study uses the Connecticut dairy sector as a case where amenity benefits are not completely reflected in milk prices received by producers, resulting in less than optimal land in dairy. A conceptual model is developed, empirically estimated, and used to examine the welfare implications of government policies to support the industry in the presence of amenity benefits.

"Amenity Benefits from Agricultural Land Retention in Eastern Canada: Some Findings." D.D. Didychuk (Nova Scotia, Dept. of Agriculture and Marketing) and J.M. Bowker (USDA, Southeast Forest Experiment Station, Athens, GA)

In this paper we examine the nonmarket value for retention of farmland in the Moncton area of New Brunswick. We measure the extramarket benefits (both use and nonuse) of farmland preservation in this region. In addition, we test a number of hy-potheses pertaining to factors explaining individual household amenity values and expand on the pre-vious works by Halstead; Bergstrom et al.; and Beasley et al. Our findings indicate that the mar-ginal benefits of preserving farmland in this region are currently very small compared to market prices.

"Using Public Referendum Data to Characterize Support for Purchase of Development Rights Programs." Jeffrey Kline and Dennis Wichelns (University of Rhode Island)

Data from a 1987 farmland preservation bond ref-erendum in Pennsylvania are used to describe pub-lic approval for farmland preservation in terms of socioeconomic variables that include percent of land in farms, percent change in land in farms, percent change in land value, percent change in population, and metropolitan and geographic char-acteristics. These variables are discussed in terms of possible social motivations for expending public funds for purchasing development rights to farm-land. Results suggest that public motivation for purchasing development rights may be more com-plex than a desire just to preserve farmland.

"Farmland Preservation in Pennsylvania: The Fiscal Impact of Preferential Tax Assessments on Local Government Finances." Kathleen Kreahling and Timothy W. Kelsey (The Pennsylvania State University)

Preferential assessments are a popular method of farmland preservation. The costs of such programs are relatively hidden, however, because they do not appear as explicit items on local government or school district budgets. This study examines the fiscal impact of Pennsylvania's preferential assessment program, Act 319. The Act reduces real property tax revenue of counties, municipalities, and school districts by an average of 3 percent (median = 0.9%), 5.9 percent (median = 2.0%), and 3.8 percent (median = 0.5%), respectively. The costs in any one taxing district varied dramatically from these averages. Taxing districts with the least development pressure seemed to bear the greatest costs.

Apple Attributes and Topics in Forestry Industry and Management

(Chair: Alberto Manalo, University of New Hampshire)
"Conjoint Analysis of Apple Attribute Preferences." Robert L. Leonard (University of Connecticut)

This paper presents a conjoint analysis of apple consumer preferences. Respondents ranked eight apples with seven attributes. Consistent results were obtained from analysis with ordered probit, OLS regression, and LINMAP. Results indicate that a rather extensive Connecticut grown promo- tion program has failed to establish a significant preference for Connecticut grown apples. There is one surprising result: the ranking implies a prefer- ence for apples priced at .79 rather than .49 per pound. Respondents apparently assumed the exis- tence of a relationship between price and quality.

"Out-Of-State Exports of Hardwood Manufacturing Industries in the Northern and Central Appalachian States." John E. Bodenman, Stephen M. Smith, Stephen B. Jones, (The Pennsylvania State University)

Natural resource-based economic development ef- forts are becoming increasingly popular. Interest focuses on industries that export from a state, in order to expand the state and local economic base. The Northern and Central Appalachian states should be ideally positioned to benefit from forest- based resources, as they have extensive hardwood forests, a favorable growth-to-drain ratio, and eas- ily accessible national and international markets. This paper examines the export levels of several hardwood product industries and uses tobit analy- sis to examine establishment and location charac- teristics related to higher export levels.

"Interdependent Forest Stands with Locationally Unique Inputs to Ecosystem Outputs: A Two-Stand Forest under One Management." Piyali Talukdar, Stephen K. Swallow (University of Rhode Island) and David N. Wear (US Forest Service and Duke University)

Forestry models often ignore spatial relationships between forest stands. This paper extends the clas- sical forest economics model to account for spa- tial, ecosystem interactions among neighboring stands which a single manager controls. The model maintains the potential for ecological production on different stands to depend on their geographic location. Simulations illustrate that even when the two stands are identical and the interactions are symmetric, the management of two stands may be asymmetric, or managers may specialize the stands, at least slightly, toward either timber or non-timber uses. Furthermore, specialization of a stand toward non-timber does not necessarily im- ply less production of timber outputs.

Outside North America: Agricultural Issues, Production, and Demand

(Chair: Hsing-tai Cheng, University of Maine)
"A Frontier Function Analysis of Economic Efficiency for a Sample of Small Farms in the Dominican Republic." Antonio E. Pinheiro and Boris E. Bravo-Ureta (University of Connecticut)

This paper presents measures of technical, allocative and economic efficiency for a sample of 60 peasant farmers in the Dajabon region of the Dominican Republic. Maximum likelihood techniques were used to estimate a Cobb-Douglas production frontier which was then used to derive its corresponding dual cost frontier. The results reveal average levels of TE, AE and EE equal to 70 percent, 44 percent, and 31 percent, respectively. In a second step analysis, a regression model was estimated where EE was expressed as a function of seven socioeconomic factors. The results revealed that contract farming, being a medium size operation and having been a beneficiary of agrarian reform had a positive and statistically significant impact on EE. By contrast, the number of people in the household and the use of credit had a negative association with EE.

"Cereals Demand in the Sudan: A System Estimate and Policy Projection." Ali H. Abdelrahman and James W. Dunn (The Pennsylvania State University)

An empirical Almost Ideal Demand System model for cereals in the Sudan is constructed. The model is based on per capita consumption of sorghum, wheat, and millet for time series data during 1979-87. The results of a system estimate of the Sudanese cereals sector are presented. The system is well behaved in that it satisfies the theoretical restrictions. The model is used to simulate and alternative policy designed to eliminate or reduce government intervention. The results indicate that prices close to free-market price should improve the balance-of-payment.

"The Indian Green Revolution Reconsidered." David G. Abler (The Pennsylvania State University)

The Indian green revolution has long been a controversial topic. Skeptics argue that it increased inequality between large and small farmers, landowners and agricultural laborers, and well-endowed and poorly-endowed regions. Recently, the green revolution's environmental impacts have been criticized. This paper takes another look at the literature. It concludes that the green revolution has been misinterpreted by both its proponents and skeptics. Inequality has increased in some cases, but no group is absolutely worse off. Environmental damages are a red herring: They reflect a failure to price the environment correctly, rather than problems inherent with the green revolution.