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## POSTER PAPER ABSTRACTS\*

### AFRICA

**Kizito Langha**, AARS-RUDARC Group, Bamenda, Cameroon – *Population pressure, technological change and agricultural growth in sub-Saharan Africa: the farming systems evolution approach*

The study examines the impact of demographic pressure on agricultural practices under four farming systems at various levels of intensification. It then explores the effects of intensification on the adoption and profitability of animal traction under these systems and assesses the impacts of intensification and technical change on household welfare levels.

**Solomon Bellele**, Consultant, Addis Ababa, Ethiopia – *Privatization of animal health services: the Ethiopian situation*

The efforts being made to promote private veterinary practice in Ethiopia through the PARC project are considered. A brief assessment is made of the level of veterinary services, their economic nature and the objectives, needs and constraints involved. Policy options for the delivery of veterinary services and strategies adopted for promoting private veterinary practice are analysed.

**Berhanu Gebremedhin**, Michigan State University, East Lansing, USA – *Effectiveness of food-for-work targeting in Tigray, Ethiopia*

For food-for-work (FFW) to meet short-term food security needs, it should be aimed at those in greatest distress and minimize 'leakages' to non-needy households. This study deals with the relationship between participation in FFW and indicators of poverty at the household level in Tigray. A probit model was used to examine factors affecting household eligibility for FFW. Double-hurdle regression was applied on eligible households to examine separately factors affecting a household's choice to participate in FFW (probit regression) and the factors affecting the decision on days worked (truncated regression). Results for 1992–5 were based on a survey of 247 households from 30 villages. FFW targeting appears to be effective in isolating wealthy households, who cultivate more land per capita, and those with higher family labour. However,

\*As mentioned in the Introduction, the organization of poster paper sessions was undertaken by Arie Oskam (Wageningen Agricultural University, The Netherlands). They are arranged here under headings which, in the main, are geographical (Africa, Asia, The Americas, General, Western Europe, Transition Economies), with countries then appearing in alphabetical order. Judith Peters was responsible for the bulk of the text editing.

targeting failed to exclude those who claim to have adequate animal work. Days supplied to FFW relate positively to literacy and household size. The only eligible households who failed to participate were unable (rather than unwilling) to do so, and were generally small, headed by elderly women. An alternative food assistance programme in the form of free food distribution is available for this needy group.

**Steven J. Staal**, International Livestock Research Institute, Nairobi, Kenya – *Public policy and incentives to peri-urban dairying in Addis Ababa, Ethiopia*

This paper uses PAM methodology to examine the impact of public policy on smallholder dairy producers in Addis Ababa, Ethiopia. Domestic milk prices were lower than export-parity prices, owing to past exchange rate policies, to the detriment of producers. Regardless of policies, dairying was shown to provide above-normal profits.

**Nico Heerink and Arie Kuyvenhoven**, Wageningen University, The Netherlands, and **K. Yerfi Fosu**, University of Ghana – *Extension services reform and agricultural production in Ghana*

The extent to which agricultural extension in Ghana can be provided by the private sector is examined and empirical evidence is given about the effect of public extension on farm production. The results have relevance for decisions on public expenditure priorities and regulatory measures to accompany privatization programmes. Theory relating to public goods and market imperfections is used to analyse the appropriate roles of public and private sectors in providing extension services. The reform of the system following the introduction of structural adjustment is evaluated. It is argued that supplementary policy measures are needed to remove some of the undesirable effects of input supply privatization. Data from the Agricultural Economics Survey is used to examine the effect of public extension on maize output using separate production functions for contact and non-contact farmers. It appears that modern input provision by the public sector has not been successful. The supply of general agricultural information has, however, enhanced farmers' efficiency.

**Johannes Jütting**, Humboldt University, Berlin, Germany – *Empirical analysis of price shifts for rice after the devaluation of the CFA-Franc in the Ivory Coast*

A case study of the effects of the CFA devaluation in 1994, conducted in the Ivory Coast, shows the ambivalence of social compensatory measures by examining observed price changes for local rice. The results from ARIMA and intervention models indicate that the theoretically grounded expectations for the effect on local rice prices after the devaluation were not realized. The models suggest a significant price effect that is stronger in rural than urban markets and occurs only after the liberalization of the import rice sector. This means that the expected price incentive for local rice production actually took effect one year later, at the beginning of 1995. The price controls on rice

imports, implemented as a social compensatory measure, helped to reduce adverse social impacts on vulnerable urban consumers, whereas rice producers were disadvantaged.

**Wachira Kaguongo, Steven J. Staal and Chris Akello-Ogutu**, ICRISAT and International Livestock Research Institute, Nairobi, Kenya – *Risk with intensification of Kenyan smallholder dairying*

The effects of risk facing smallholder dairy farmers in highland Kenya were examined through qualitative analysis and simulation modelling. Stochastic dominance tests showed that intensification of dairying through increased use of inputs tended to reduce risk-adjusted farm welfare. Market outlet and production risks thus remain impediments to increasing farm productivity.

**Joseph Karugia and Michele Veeman**, University of Alberta, Edmonton, Canada – *Quality factors affecting the value of beef in Kenya: an assessment of relevant grading attributes*

Experimental choice data were collected and analysed, using a multinomial logit model of butchers' contingent behaviour, in order to identify and estimate the implicit values of certain quality attributes of Kenyan beef. The results show that those of carcass conformation (shown to be the most important), fatness and weight are crucial in determining the value of a carcass at the wholesale level. This information can be used by farm managers to adjust production systems to meet market requirements, substantially increasing the value of their animals by improving conformation. The results indicate that animal breeders should breed for large animals with good conformation and intermediate fatness. Fat carcasses are preferred to lean ones, though there is discounting of overfat carcasses.

**Bradford F. Mills**, ISNAR, The Hague, Netherlands – *Ex ante research evaluation and regional trade flows: maize in Kenya*

This paper develops a dynamic spatial-equilibrium model to estimate adaptive research benefits when transaction costs are associated with commodity trade among regions. Adaptive research is usually aimed at one specific region, though the associated benefits could include pecuniary spillovers to other regions if inter-market transaction costs permit trade. Such research requires an extended time horizon to evaluate the impact of agricultural technologies. The application of research, as well as other factors influencing supply and demand for agricultural commodities, may, over time, affect the trends in commodity prices. Movements in relative prices can change, or even reverse, trade flows between regions. The study of maize in Kenya highlights the impact of trade flow reversals on the magnitude and distribution of research benefits. The analysis also highlights the challenge to national self-sufficiency posed by rapid population growth.

**Daniel Ngugi, Charles Mataya and Davies Ng'ong'ola**, Bunda College of Agriculture, Kenya – *The implications of maize market liberalization for market efficiency and agricultural policy in Kenya*

Liberalization of the domestic maize market in Kenya was completed almost three years ago as one of the conditions of Structural Adjustment Programme (SAP) funding. The motive was to promote market efficiency. Correlations of price differences and cointegration techniques were employed to study market integration, here used as an efficiency indicator, while an error correction model was used to test for causality among markets and examine the occurrence of central markets. Weekly retail prices of maize in 13 locations made up the data set. Results suggested that there were more integrated markets after liberalization than before and there was also more unidirectional causality. This conclusion lays to rest past fears that the private sector would be unable to run the liberalized market efficiently.

**Angelos Pagoulatos, Georges Abbey, Tulin Ozdemir and Stephan J. Goetz**, University of Kentucky, Lexington, USA – *Efficiency and safety: a joint hypothesis in farm portfolio decisions among Settatt farmers, Morocco*

The poster examines empirically the trade-off between crop production efficiency and safety (survival) among a sample of 207 limited resource farmers in the Settatt Region, Morocco. A comparison of alternative chance-constrained expected utility functions shows that exponential and power functions lead to the closest approximation of actual crop mixes.

**Daphne S. Taylor and Truman P. Phillips**, University of Guelph, Canada – *Household food security assessments in Mozambique and Laos*

Household food security is the ability of household members to ensure for themselves sustained access to sufficient quantity and quality of food to live healthy active lives, both now and in the future. Food security has two components, relating to the current situation and to the future. The aim here is to summarize survey results from Laos and Mozambique. Household food security results from Laos (316 households) are compared with anthropometric indicators for children under five years old. The results from Mozambique (2160 households) are used to demonstrate the dynamic nature of food insecurity and identify target groups in need of assistance. The assessment tool used is unique, rapid and can be replicated.

**Truman P. Phillips and Daphne S. Taylor**, University of Guelph, Canada – *Estimating food aid needs using household-level data*

A representative food security survey of 2160 households in 12 districts in the Zambezi Valley and Central Mozambique was undertaken from August 1995 to October 1995. Monthly food requirements by district and food commodity were estimated using information about food group insufficiencies, the season and duration of insufficiencies and the contribution to current consumption from

food aid sources. Four alternative formulations of food needs were estimated and compared to World Vision (WV) estimates for 1995/96. The four alternatives contained values equivalent to WV estimates of food needs in maize, legumes and vegetable oil for the surveyed areas, although some redistribution between districts following more accurate identification of targets may be required.

**Glenn R. Rogers**, USAID, Washington, DC, USA – *Maximizing illicit payments and restricting trade in West Africa*

The market for illicit payments to public agents along roads in West Africa is described using data from Niger, Burkina-Faso and Côte d'Ivoire. Efficiency measures for illicit payments show that public agents respond to market incentives but sometimes extract excessive payments which cause market collapse. Agents in Côte d'Ivoire captured an increasing percentage of illicit payments on onions over the last decade and caused significant loss of income to the region. National governments have reduced legal trade taxes to promote exports, but illicit payments in other countries increased and offset the benefits of initial market liberalization, thus encouraging countries to reimpose legal trade taxes. It is argued that legal taxes and illicit payments, as trade constraints, must be addressed together on a multi-country basis using market and non-market incentives. Greater transparency and provision of information, in combination with enhanced enforcement of regulations, has temporarily reduced illicit payments. However, increased competition in the market for these payments will be required to achieve significant reductions that will foster more rapid economic growth. This is the necessary next step in the liberalization of agricultural markets.

**G.B. Ayoola**, University of Agriculture, Mekurdi, Nigeria – *Intervention policy in agriculture: a theoretical model of the two-sector developing economy*

The implicit need for a distinct theory of agricultural policy in a developing economy is predicated upon the widespread view that fundamental differences exist, in terms of structure and function, between developed and developing areas. The tenability of the view is established in development economics literature. Yet knowledge about the structural and functional character of the developing economy is generally overlooked, or taken for granted, when experts explore options for appropriate policy intervention for sustained growth of agriculture. Using Nigeria as a typical example, it is argued that a definite structure can be ascribed to the developing economy giving scope for effective policy intervention. The aim is to establish a theoretical framework for manipulating policy instruments to assist agriculture.

**Hiroki Inaizumi and Akinwumi A. Adesina**, International Institute of Tropical Agriculture, Nigeria – *Determinants of rapid dissemination of an improved cowpea variety in Northern Nigeria*

Cowpea is one of the most popular and important legumes in West Africa. There are many irrigation schemes to allow the utilization of residual moisture

for dry season farming in Northern Nigeria, which were focused initially on cereals like wheat and rice. However, these cereal systems have faced many constraints, including commodity price uncertainty. A cowpea crop has potential as part of a rotation system for dry season cropping. Major constraints identified by farmers are insect pests, hence IITA developed what appeared to be the most promising resistant variety (IT89KD-288). Between 1993 and 1996, this variety was adopted, without external intervention, by over 200 farmers in Bunkure village, and the number is still increasing. Information from about 600 households has been collected to study the main factors responsible for adoption and the impediments which exist.

**G.G. Antrobus, G.C.G. Fraser and S.P. Mowat**, University of Fort Hare, South Africa – *The effects of economic incentives in controlling pollution in the South African leather industry*

Pollution of the environment is becoming an increasingly serious problem, a major contributor being industries generating effluent as a by-product of their production process. Two methods of avoidance are the so-called 'command and control' techniques and 'economic incentives'. In theory, the latter promise a more economically efficient and equitable means of pollution control. This paper sets out to ascertain whether this would hold in practice, by applying environmental economic theory to the practical problem of controlling effluent generated by the South African leather industry.

**Johan Kirsten and Rob Townsend**, University of Pretoria, South Africa – *Measurement and determinants of household nutritional status: the role of farm and non-farm activities in KwaZulu-Natal, South Africa*

There is a relationship between household nutritional status and agricultural production amongst a sample of rural households in KwaZulu-Natal. The results from multivariate analysis and a logit model indicate a positive contribution of agricultural activities to household nutrition.

**Michael Lyne and David Thomson**, University of Natal, South Africa – *Adapting customary institutions to promote an efficient rental market in tribal land: an empirical study in KwaZulu*

In a study conducted on tribal land in KwaZulu-Natal, the aims were (a) to reinforce tenure security and to reduce transaction costs in the rental market for farmland, and (b) to monitor the effect of rental transactions. Small institutional changes had a marked impact on market activity, bringing idle land into production and improving the welfare of both lessors and lessees.

**Nico Meyer and Tommy Fenyes**, Development Bank of South Africa, Halfway House, South Africa – *The impact of agricultural marketing policy on the agricultural sector*

The impact of agricultural marketing policy on farm production in South Africa is explored in this paper. Although a new player on the international scene, there is no evidence to suggest that it is experiencing anything different from what is generally found. A linear programming model was developed to project changes in production, prices and welfare brought about by market liberalization.

**Johan van Rooyen and Simphiwe Ngqangweni**, University of Pretoria, South Africa – *Farm worker participation schemes as a mechanism for reform in South Africa*

It is likely that large commercial farms will remain a predominant feature in South Africa. It is therefore logical to seek ways of increasing rural livelihoods and access to land on such properties through new ownership relations as part of agrarian and land reform. The participation model discussed proposes the rearrangement of ownership to include farm workers and thus involve them in the mainstream economy.

**Cesar Guvele and Allen Featherstone**, Kansas State University, USA – *The determination of steady-state cropland: a numerical analysis for Sudan*

Water from the Sennar reservoir (which originates in the Blue Nile) for Sudanese agriculture is scarce. This poster examines how to allocate water to the 2.1 million feddans in the Gezira gravity irrigated scheme. The objectives involve determining optimal intertemporal water allocation, the stability of crop allocation over time and the optimal cropping strategies under different scenarios. A dynamic optimal control model (50-year period) is used to 'allocate' water. The current cropping constraints imposed by the Sudan Gezira Board result in distortions relative to free water allocation by farmers, reducing potential income. At the same time, the amount of water used would not increase significantly. It is argued that returns to farmers would be greater, under the current cropping constraints, if yields were higher. If the government was to move towards free market prices for products, farmers would need greater freedom in crop allocation.

**Cesar Guvele and Allen Featherstone**, Kansas State University, USA – *Gains from crop diversification in the Sudan Gezira scheme*

This study examines crop diversification in the gravity-irrigated Gezira scheme, where farmers encounter many forms of uncertainty. Although government price and crop land regulation aims at its reduction, it may not do so because prices are announced after planting. The control of cultivable area also inhibits diversification. This study determines optimum crop combinations for this multi-crop production system. The mean-variance model is used for both cross-sectional and time-series farm-level data. Farmers' risk attitudes are often represented with a utility function, such as the negative exponential, which postulates a specific algebraic form to represent risk preferences. The mean variance model certainty equivalents range from 600 to 721 Sudanese pounds



per feddan and marginal effects range from 0 to 84.84 Sudanese pounds for cotton, 0 to 467.35 for wheat, 0 to 378.94 for groundnuts and 223.62 to 586.63 for sorghum (which is excluded at all levels of risk aversion).

**Samba Sall, David Norman and Allen Featherstone**, Kansas State University, USA – *Farmer preferences and the adoption of improved rice varieties in the Casamance, Senegal*

This study applied a technology characteristic approach to the adoption of improved rice varieties in Southern Senegal. The objective was to test the hypothesis that not only farm and farmers' characteristics, but also farmers' perception of technology-specific characteristics, significantly influence the technology adoption decision. Earlier studies have not quantitatively incorporated the farmers' perceptions of the technology in the analysis of adoption. Farmers' attitudes towards rice varieties were elicited quantitatively on the basis of a method developed in industry. Based on a stratified random sample of 400 farmers, the results showed that farmers used different discriminatory criteria. They demanded rice varieties with a short maturation period, tall stature, good resistance to soil-related constraints and good cooking quality. A Tobit model indicated that farmer-specific variables (initial impression of the variety, information acquired, participation in village-level organization and age) and the technology-specific factors were significant in explaining the adoption of improved varieties. The results also showed that the response to changes in these technology-specific attributes was relatively more elastic than the response to changes in the farmer-specific factors. Therefore research and extension efforts concerned with the adoption of improved technologies need to consider farmers' perceptions of technology-specific attributes.

**Samba Sall, Cesar Guvele, Allen Featherstone and David Norman**, Kansas State University, USA – *Efficiency measures, farming systems research and extension activities in Southern Senegal and the Sudan Gezira*

Farming systems research and extension (FSR/E) involves tailoring research, extension and developmental/policy initiatives to the needs of different types of farmers classified into research/recommendation domains. Using primary data from Southern Senegal and the Sudan Gezira, non-parametric programming is used to estimate different efficiency indices. The mean levels of the indices suggest that there is much room for improvement, while the variation and range in their values indicate considerable heterogeneity in the farming population. Regression (Tobit) analysis on the Senegalese data showed that improvement in efficiency would require specific action in research, extension and development/policy initiatives. The results not only justify the basic FSR/E tenet of taking into account the heterogeneity of the farming population, but also point to the need for close interactive linkage between farmers and research and extension personnel. Although the non-parametric approach has some value in FSR/E under specific circumstances (for example, to demonstrate need for interaction between the developmental actors or to convince sceptics of the importance of understanding the local production environment),

it is not a substitute for other techniques currently used (such as participatory rural appraisal).

**Anacleli K. Kashuliza**, Sokoine University of Agriculture, Morogoro, Tanzania – *Participatory plant breeding and impact studies of the bean (CRSP) in Tanzania*

This presentation discusses the participatory plant-breeding model which has guided the bean (CRSP) breeding programme at Sokoine University for the past 5 to 10 years and assesses the outcomes of the approach. There is also a brief review of the adoption of this particular bean variety and of impact studies which have been conducted in Tanzania since 1994.

**Angelos Pagoulatos, Aida Isinika, David L. Debertin and Stephan J. Goetz**, University of Kentucky, Lexington, USA – *The effect of agricultural research and extension expenditures on the productivity of crop production in Tanzania*

Results are reported of a study measuring the effects of spending on agricultural research and extension on crop production in Tanzania. The study uses Tornquist–Theil–Divisia indices and is based on a production function estimation using data for the period 1972–92.

**Ntengua Mdoe**, Sokoine University of Agriculture, Morogoro, Tanzania – *Environmental hazards of agricultural chemical use in the southern highlands of Tanzania*

The haphazard sale and use of agricultural chemicals in the southern highlands of Tanzania, since the implementation of market reform policies, has potential environmental risks. The aim is to present empirical findings of a recent study on agrochemical use and environmental effects in the southern highlands.

**Biruma Abaru, Allen Featherstone and David Norman**, Kansas State University, USA – *Credit to low-income women in Uganda*

Because lack of credit was viewed as a limiting factor preventing women farmers in Uganda from increasing agricultural production, the Rural Farmers Scheme (RFS) was introduced aiming to give them 60 per cent of its credit. To increase the participation of women, some of the normal RFS credit eligibility requirements were relaxed (for example, character loans are made, women borrowers need not be old customers of the bank, and the loan is for any agricultural enterprise). The study evaluates participation of women by examining and comparing loan sizes, loan repayments, credit needs of borrowers and relative loan losses of borrowers. A sample of 1012 borrowers from 1987 to 1995 indicates that RFS approved higher loan amounts to women than to men, but for actual disbursements women received less. Results showed poor repayments by both men and women, but loan losses revealed that men were worse. Regression analysis (GLS and Tobit) identified a number of factors, apart from gender, as important. Unless major

changes are made in the approach used by RFS, women will not benefit from the programme.

**Jim Wright and Stephen W. Gundry**, University of Edinburgh, United Kingdom – *Local indicators of food security and the use of growth-monitoring data in Zimbabwe*

The relationship between long-term patterns of malnutrition and the infrastructure and socioeconomic characteristics of Zimbabwean districts is investigated. Principal components analysis of household and district-level variables is combined with regression analysis of time-series of malnutrition rates. The analysis confirms that persistent malnutrition is related to lack of rural development.

**Godfrey Mudimu, Jim A. MacMillan and Lovemore Rugube**, University of Zimbabwe, Harare, Zimbabwe – *Crop diversification, food security and sustainable soil and moisture tillage among smallholder farmers in Zimbabwe*

A case study has been conducted analysing incentives for widespread adoption of soil and moisture conservation practices by smallholder farmers in a high rainfall zone in Zimbabwe. The study quantifies the relationship between conservation practices, total crop production and farm household income. The study tests the hypothesis that intensive agriculture, based on cash crop production and application of soil and moisture conservation practices, increases land and labour productivity with positive effects on household food output and income. The results show that sustainable cropping systems are profitable and improve household food security and incomes at the farm level. This provides a basis for widespread adoption by small farmers.

**Stephen W. Gundry, Jim Wright and Prabhat Vaze**, University of Edinburgh, United Kingdom – *An integrated model of the food system in a region of Zimbabwe*

The malnutrition–infection complex provides the basis for a systems dynamics model of household food access and its interaction with health. Temporal variability of production, sales and purchases of staples by households is modelled and compared with household nutritional requirements to provide an estimate of nutritional sufficiency.

**Caroline Younger and Stephen W. Gundry**, University of Edinburgh, United Kingdom – *Perceptions of livestock value in Zimbabwe's communal lands*

The study explores relative values associated with livestock in semi-arid areas, indicating that economic motives underpin farmers' actions. This finding questions previous suggestions that livestock management is based on biological survival and cultural influences. Such understanding of the crucial role of livestock in complex livelihood systems will aid the attainment of goal congruency between farmers and developers.

**ASIA**

**H. Basavaraja**, University of Agricultural Sciences, Dharwad, India – *Land use dynamics in India: An agricultural perspective*

Land use in India was appraised over 40 years, starting in 1950–51 and dividing time into three sub-periods. An exponential growth model was then applied. Mutual transferences among land use categories were identified using correlation analysis. Net area sown registered an overall growth of 0.33 per cent per annum. Growth was 0.93 per cent during Period I, with the growth in forest cover at around 2 per cent. However, the same tempo could not be maintained during Period II and it was negative in Period III. In the latter period the amount of fallow land increased at the expense of the area under crops (it grew from 10 million hectares to 15 million hectares), while the area under non-agricultural use rose at the expense of pastures and grazing land.

**Ramachandra Bhatta and Mahadev Bhat**, Florida International University, Miami, USA – *Irreversible environmental development and survival of subsistence agriculture in coastal India*

The paper formulates an ecological–economic model of interactive agriculture and aquaculture sectors in India to examine the impacts of shrimp pond development on economic variability and hydroecological sustainability of the coastal environment. The model identifies circumstances in which it remains feasible to encourage crop-to-shrimp land conversion. The analysis shows that some of the government's own policies may push the development threshold downwards and weaken the ability to protect the environmental basis of traditional agriculture.

**Amar S. Guleria**, Himachel Pradesh University, Shimla, India – *Trade and price analysis of forest products in India*

An attempt has been made to analyse recent Indian policy changes in general and their impact on the trade of major forest products. Forest resources are 98 per cent government-owned, which is contrary to the overall economic policy measures of price liberalization and competitiveness. However, since the adoption of these measures there has been a decrease in the trade deficit of wood products. The growth in exports and export value is now fairly impressive, even after accounting for the devaluation of the rupee. From regression analysis it appears that demand for the majority of wood products is price-inelastic, though the benefits of higher competitive prices did not accrue to forest managers.

**Kiyotada Hayashi**, Department of Integrated Research for Agriculture, Fukuyama, Japan – *Evaluating labour-saving production systems by multi-criteria models with interval numbers*

A methodology is presented for evaluating new farm production systems using multi-attribute value models with interval numbers. The technique is applied to

the evaluation of labour-saving production systems at farm level and is based on the elicitation of values and weights. The main features are (1) introducing interval computations to deal with imprecision and uncertainty; (2) distinguishing between strict preference, weak preference and indifference; (3) representing preferences among alternatives using graph theory; (4) combining interval numbers with sensitivity analysis to examine stability of preferences and effects of technical improvements; (5) utilizing swing weights to properly treat the relationship between weights and ranges for evaluation measures. For Daikon (*Raphanus sativus* L.) new production systems (introducing a self-propelled harvester and eliminating thinning) are being developed and compared with the conventional system in terms of profitability and farmwork characteristics. The results indicate that, although the new production systems at the present level of techniques are not preferred to the conventional system, they would become viable if further improvements in cultivation and mechanization could be achieved.

**S.B. Hosamani, G.K. Hiremath and K.N. Ranganatha Sastry**, University of Agricultural Sciences, Dharwad, India – *Institutional reforms in agricultural finance in India: a case study of performance of regional rural banks (RRBs)*

In view of divergent opinion about the performance of RRBs, and amid controversy over their continuance, a rigorous evaluation of their position was felt necessary at this time of marked change in India's economic policies. Analysis of primary and secondary data using financial ratio analysis revealed favourable liquidity, solvency and strength, though use of an exponential growth model indicated weaknesses in profitability despite the growth in other indicators.

**Keishito Itagaki**, University of Agriculture, Tokyo, Japan – *Food processing industries in East Asian countries*

The aim is to examine the dynamic structure of processed food trade among East Asian countries. Emphasis is placed on the nature of the market structure and the extent and effectiveness of the linkage between the food processing industry and the farm sector as supplier of basic food inputs.

**Tamotsu Kawamura and Jin Shen He**, Iwate University, Japan – *Measuring the productivity of multi-purpose agricultural cooperatives*

On the basis of productivity measurements for Japanese multi-purpose agricultural cooperatives, it is suggested that (1) total factor productivity of the cooperatives had grown by 10 per cent per annum in the 1960s and the first half of the 1970s; (2) it was stagnant in the later 1970s and 1980s; and (3) it has been decreasing in the 1990s.

**S. Lakshmikanthamma**, Bangalore, India – *Economic impact of watershed development on dryland agriculture in Karnataka, India*

A watershed development programme (WDP) has been initiated in Karnataka to improve and sustain the productivity and production potential of dryland agriculture through adoption of appropriate conservation and production technologies. It is a holistic approach to improve the economic and natural resource base of the dry regions. The paper assesses its impact on cropping patterns and intensity, crop yields, income and employment. The results show that the WDP has led to greater crop diversification, a shift from low- to high-value crops, with improved cropping intensities and crop yields. The per hectare productivity of aggregate crops was distinctly higher in the watershed project area as compared with the non-project area among all size groups of holdings. The programme also resulted in higher per hectare investment followed by higher returns from crop production for most strata of farms. This programme has led to an improvement in household incomes as well as a reduction in poverty among small farmers. WDP thus offers a ray of hope to the poor and disadvantaged regions of India which could benefit from a development alternative addressing concerns linking growth with equity and sustainability.

**C. Lapenu and M. Benoit-Cattin**, CIRAD, Montpellier, France – *An interpretation of the restructuring of the Indonesian rural financial system using the theory of contestable markets*

The evolution and performance of the Indonesian rural financial system is impressive and the state has played a key role since liberalization. Its action can be interpreted as creating a contestable market: the entry of new actors forces the incumbents, most particularly the public institutions, to be efficient and perform well. This theoretical framework highlights the possibilities for improvements to the financial system.

**Pramod K. Mishra**, Gujarat Electricity Board, Baroda, India – *Political economy of electricity supply to agriculture: a case of resource mismanagement*

In many countries the pricing of electricity supplied to agriculture is devoid of economic logic, ignores incentive effects and is influenced by political considerations. Consequently, there is not only less than optimal allocation but also mismanagement of resources, which poses a threat to sustainable agricultural growth. The analysis is based on empirical data from Gujarat (India).

**Rolf A.E. Mueller and Edward S. Prescott**, University of Kiel, Germany – *Hired hooves: An empirical investigation of village markets for bullock services in the semi-arid tropics of India*

Efficient production requires that factors of production be used in optimal combinations. Since farmers rarely own factors in their most productive proportions, markets, for the leasing of factors, are formed to facilitate adjustment of availabilities to desirable proportions. Bullocks are widely used as draught animals in India. Bullock to labour proportions are technically determined; generally, one bullock pair is driven by one driver. Bullock to land ratios may

be adjusted through tenancy transactions or by hiring bullock services. The literature on agricultural factor markets frequently claims that bullock to land proportions are adjusted through the land market because of poorly developed markets for bullock services. The study provides evidence to the contrary. Key results are that (1) despite covariate demand for bullock services, an active market exists, (2) bullocks are hired by farmers who own bullocks as well as those who do not, (3) spot contracts for single operations dominate, (4) despite variable demand, cash prices are virtually constant, and (5) there is much monitoring, but contract enforcement is not a concern.

**Ryo Nakajima and Ryohei Kada**, Kyoto University, Japan – *Cointegration analysis of government agricultural expenditure growth in Japan*

This paper analyses the government preferences influencing the growth of agriculture expenditures in postwar Japan. Assuming that the government's aim was utility maximization, a cointegration approach is used to estimate parameters of the utility function. A well-specified long-run relationship between agricultural expenditure, government total expenditure and the agricultural population rate in Japan is found.

**Yasuo Ohe**, Chugoku National Agricultural Experiment Station, Hiroshima, Japan – *The characteristics of the tourists visiting farms in Japan for recreation*

Tourist characteristics were analysed by focusing on visitors to pick-your-own farms using a nationwide survey. They are found to have a higher academic background and respect for cultural matters than tourists in general.

**Katsuhiro Ota**, University of Agriculture, Tokyo, Japan – *Asian rice security*

Rice is an essential food for most Asian people. For them 'rice security', based on sustainable development of rice production and trade, implies 'food security'. The poster examines the development path and pattern of the rice industry in Asian countries and explores the implications for 'rice security'.

**M.A. Razzaque and Mafizul Islam**, Bangladesh Agricultural Research Council, Dhaka, Bangladesh – *Planning for research and development in hill farms in Bangladesh through the application of PRA*

Participatory Rural Appraisal (PRA) was conducted to identify constraints, opportunities, needs and potential for hill farming in Bangladesh. The exercise generated useful guidelines for research, development and policy issues for the development of hill farming on a sustainable basis. Given farmers' perceived needs and taking account of the significant risk factors involved, integrated production plans for agroforestry and livestock have been developed and an operational strategy has been suggested. The testing and transfer of system-based technologies, which are closely linked to market and rural agribusiness enterprises, are advocated to augment the income and welfare of hill farmers, the most unprivileged community of Bangladesh.

**Abelardo Rodrigez**, Centre for Agricultural Research in Dry Areas, Aleppo, Syria – *Can groundwater be managed sustainably in Syria?*

Modern irrigation systems introduced in Syria during the 1970s have increased and stabilized farm income in semi-arid areas. Farmers are aware of declining water tables, but appear resigned to a return to rainfed agriculture. More well drilling is seen as a rational response to increasing water scarcity. The absence of efficient monitoring systems for irrigation practices, the land tenure and water rights situations, and farmers' perception and attitudes, dissuade cooperative irrigation scheduling or water sharing. Current economic incentives to produce agricultural commodities, tilting preferences towards the present rather than the future value of water, compound the unsustainable choices made by farmers.

**Seiichi Sakurai**, Chugoku National Agricultural Experiment Station, Hiroshima, Japan – *Direct roadside marketing by farmers to consumers in Japan*

Many Japanese farmers' groups are now engaged in selling their products to consumers directly at roadside markets. This development has brought changes in the organizational structure and the management systems of markets, notably in the employment of sales clerks and later in the growth of more sophisticated management systems to provide farmers with information about market trends. On the basis of survey evidence, it is suggested that direct marketing has advantages of flexibility in pricing and grading and offers good opportunities for communication between suppliers and purchasers. Although it has some problems, it has had positive effects on farmers' incomes. Though it is likely to be a secondary channel, it could be an effective one in Japanese conditions.

**K.L. Sharma**, University of the South Pacific, Suva, Fiji – *Constraints on agricultural development in Fiji*

The characteristic features of the Fiji economy emphasize the importance of agriculture in economic development. Some socioeconomic and institutional constraints affecting the performance of agriculture are identified during the period 1970–95. Specific policies on technology, agricultural research and extension, land tenure and infrastructural development need to be instituted to increase agricultural productivity.

**Teruyuki Shinbo, Koto Asano and Ryohei Kada**, Kochi and Kyoto Universities, Japan – *Hedonic evaluation of the amenity of paddy fields in Japan*

Recently in Japan, much attention has been paid to the importance of the externalities of agriculture and forestry for neighbouring areas; hence the number of studies using the hedonic approach in evaluating the amenity of agriculture and forestry land in monetary terms is increasing. The hedonic method, based on a capitalization hypothesis, estimates the shadow price of the environmental factors through a regression analysis. In applying this method,



however, there are various theoretical and methodological problems. The current study addresses the issue of model selection of a hedonic rent function by non-nested testing. It is crucial to specify correctly since use of an unsuitable model leads to unreliable evaluation. The advantage of using a diagnostic test is that it makes it possible to analyse the specification of the hedonic rent function by a test of a statistical hypothesis.

**C.A. Tisdell and S.R. Harrison**, University of Queensland, Australia – *Control of foot-and-mouth disease in Thailand: improving CBA assessment*

Foot-and-mouth disease (FMD) is endemic to Thailand but, while it causes considerable loss, no satisfactory analysis exists of the costs and benefits of control. The government has adopted measures to increase the coverage of livestock vaccination by subsidizing vaccine supplies, providing assistance from Department of Livestock officers, provision of information to farmers particularly through village headmen, as well as requiring vaccination of cattle travelling significant distances to market or arriving from neighbouring countries. Estimates of the benefit–cost ratios of controlling FMD vary greatly (from 1 to 5; 11.75 to 1 and 7.35 to 1) owing to paucity of data and the scale of the problem considered. Studies are reviewed and it is concluded that the quality of CBA assessment will not improve until many problems are overcome. Attention is also given to the economies of regulating cattle movements in Thailand in order to control FMD.

**C.A. Tisdell and Ren Zhuge**, University of Queensland, Australia – *Slash-and-burn agriculture in Asia: sustainability issues and transitional problems*

Estimates indicate that 300–500 million people worldwide depend on slash-and-burn agriculture. It is widespread in Asia, but is becoming unsustainable because socioeconomic changes are reducing the length of the fallow period, with adverse economic and biophysical consequences. Population pressure, withdrawal of land from villagers practising the technique, rising income aspirations of participants and their increasing involvement in the market economy have all played a role in the process. While shifting agriculture is often associated with environmental problems, food shortages and poverty, the transition to settled farming causes problems because it is difficult to change institutional arrangements governing property rights. Furthermore, suitable sustainable forms of settled agriculture are not always available, particularly in hilly or mountainous areas. Examples from Yunan, China (the Jingpo) and Northeast India illustrate these issues.

**Jessica D. Tjornhom and Victor Gapud**, University of Minnesota, Minneapolis, USA – *Pesticide policy dimensions of integrated pest management in the Philippines*

Pesticide use has increased worldwide, resulting in a growing set of problems related to human exposure and environmental contamination, pest resistance to pesticides and pest resurgence. Pesticide prices can influence producer deci-

sions to apply pesticides as opposed to non-chemical means of pest control. Those prices in turn are influenced by agricultural and exchange rate policies. The aim is to present the case for assessing pesticide price distortions as part of the agenda for agricultural economics research in integrated pest management. It is illustrated by the application of pesticide policy analysis to Philippine data to assess the direct and indirect subsidies and taxes on pesticide use in that country.

**Pei-Ing Wu and Heng-Chi Lee**, National Taiwan University, Taipei, Taiwan – *Trade and environment: pollution control of hog production in an open economy*

The intention is to develop a theoretical linkage between trade and environment. The theoretical framework is applied to the case of pollution control of hog production in Taiwan. Values of social welfare under different policy combinations are computed and compared. The results indicate that various trade restrictions have different impacts on producers, consumers, and government expenditure. Free trade results in the highest value of social welfare.

**Xu Xiang and Wang Kai**, Nanjing Agricultural University, R.R. China – *China: Can the awakening giant feed a wealthier population?*

There is considerable interest in the future relationship between food supply and demand in China and in the related issue of food security for the next three decades. The questions are examined in five parts: 1. An introduction to the great debate; 2. Factors affecting the demand for grain, including population analysis, income growth, changes in the diet pattern; 3. Projections of grain demand in 2030; 4. Supply prospects, including area projections, yield projections, food security analysis; 5. The way ahead: self-sufficiency or comparative advantage?

**Zhang-Yue Zhou**, University of Sydney, Australia and **Liang-Biao Chen**, Ministry of Agriculture, Beijing, China – *China's grain distribution system and its reforms*

A non-specific grain rationing system in China (in place for about four decades) ensured fair distribution of grains among consumers, but it also caused some problems which led to recent changes. This paper provides an overview of the system, highlights the problems resulting from it and addresses its recent reforms. Attention is drawn to related issues emerging as a result of the reforms. It is emphasized that, while the reforms are necessary, they should not be allowed to jeopardize the food security of the poor and that the distribution of government-subsidized grains should be aimed at the poor.

## THE AMERICAS

**Godfrey C. Ejimakor and Jimmy Zuniga**, A and T State University, Greensboro, NC, USA – *Socioeconomic changes and evolution of agricultural policy*

Survey respondents were grouped and profiled by choice of agricultural policy. The relationships between selected socioeconomic variables and the indicated policy choices were estimated. Levels of group characteristics seem to affect policy preferences. Agricultural policy is expected to keep changing in response to changes in these variables.

**Arthur M. Havenner and Daniel A. Sumner**, University of California, Davis, USA – *Time-series analysis of a policy-created asset: the case of the California dairy quota*

A forecasting model of the California milk quota is fitted for monthly observations. The multivariate model uses quota milk price, overbase price and the value of the quota asset to characterize the dairy farm portfolio. The model predicts well out of sample.

**Ruud Huirne**, Wageningen University, The Netherlands – *Goals, critical success factors and information needs of Dutch and US dairy farmers*

One of the major problems for farm-level information system users and developers is to determine farmers' goals, critical success factors and information needs. These are generally based on their management strategies with respect to important decisions. The identification of goals, critical success factors and information needs of individual farmers must be followed by an investigation of their similarity and consistency according to region and time, respectively.

**Hans G.P. Jansen, André Nieuwenhuyse, Leedert't Mannetje, Muhammad Ibrahim, Sergio Abarca Monge and Mark Joenje**, REPOSA, Costa Rica and Wageningen Agricultural University, Netherlands – *The economics of improved pasture and silvipastoral technologies in the Atlantic zone of Costa Rica*

Capital budgeting models were used to investigate the profitability of alternative ways to increase beef production: grass-legume mixtures, silvipastoral systems and supplementary feeding. Profitability depended on meat prices, stocking rates and length of investment period. Financial benefits of the silvipastoral system were significantly lower than those based on use of grass-legume mixtures, though no effort could be made to incorporate non-monetary benefits of including trees within farm systems. Supplementary feeding constitutes an attractive option only on poorer soils and in capital-scarce environments.

**Mary A. Marchant, Ravichandran Munirathinam and Michael R. Reed**, University of Kentucky, Lexington, USA – *International trade and foreign direct investment*

The impact of the Canada–United States Trade Agreement (CUSTA) on the trade of bulk, intermediate and consumer-oriented processed foods between the United States and Canada is considered. The research also seeks whether exports of these products and foreign investment in the sector are complements or substitutes. Results indicate that US exports to Canada more than doubled, while Canadian exports to the United States nearly doubled after CUSTA's implementation in 1989. Regression results using the covariance model on panel data show that US food processing firms use both exports and direct foreign investment as complementary marketing strategies in selling into Canadian markets. This is also true of some Canadian firms, though others use exports and FDI as substitute market strategies in gaining access to US markets. In the case of bulk and intermediate products, it is not possible to determine whether exports and foreign investment are substitutes or complements.

**Shankar Narayanan**, Agriculture and Agri-Food Canada, Ottawa, Canada – *Canadian agricultural growth: trends, policy relevance and comparisons with the United States*

The highlights of the recent updating of total factor productivity estimates for Canadian and US agriculture over the 1961–93 period are discussed. In the post-1980 period, Canadian agriculture productivity rebounded strongly, supported by government policies of large subsidy programmes to bolster output, accompanied by a sharp fall in labour input in all regions and a general decline in all input categories in eastern Canada. The long-term (1961–93) productivity growth (technical progress) for Canada stood at an annual rate of 2.3 per cent, against 2.0 per cent in the United States – a slight competitive edge narrowing significantly from the 1960s and the 1970s.

**Bo Ohlmer, Kent Olson and Berndt Brehmer**, University of Minnesota, St Paul, USA – *Understanding farmers' decision-making processes and improving managerial assistance*

Farmers' decision making is described as a matrix of phases (detection, definition, analysis, implementation) and sub-processes (information and attention, planning, evaluation and choice, and bearing responsibility). Farmers used continual updating, qualitative methods, 'quick and simple' methods, incremental implementation and feed-forward evaluation. Implications for management assistance are discussed.

**John L. Pender**, IFPRI, Washington, DC, USA – *Causes and effects of agricultural intensification: evidence from Central Honduras*

The causes and effects of agricultural intensification in Central Honduras are investigated using three-stage least squares. Contrary to Boserup's theory, population pressure is not associated with adoption of labour-intensive land improvements, inputs or higher-value crops. Access to markets, technical assistance and irrigation are associated with such intensification.

**Anne Villamil and Laurian Unnevehr**, University of Illinois, Urbana, USA – *Measuring the value of food product health attributes with experimental auctions*

Experimental auctions are used to test whether consumers will pay more for food products with health benefits; how information about health benefits and consumer health endowments influence willingness to pay; and whether there is a gap between willingness to pay and willingness to accept for products with health benefits.

**John Westra and Kent Olson**, University of Minnesota, St Paul, USA – *Farmers' decision processes and adoption of conservation tillage*

Farmers were surveyed about adopting conservation tillage. Logit analysis showed the following factors to be significant and positive: farm size, erosion concerns, recent investments in the farm, management skills, production goals, physical setting and other farmers. Negative significant factors were found to be ease of obtaining information and amount of control over the decision.

**Zhikang You and Wojciech J. Florkowski**, University of Georgia, Griffin, USA – *Factors influencing the frequency of consumption of selected nuts*

Frequency of consumption of selected nuts was examined on the basis of local survey data using a multi-ordered probability model. Results suggested that female, white, full-time employed or older respondents had a higher probability of selecting pecans than walnuts or peanuts. Male or urban residents were more likely to choose peanuts than pecans or walnuts, while farmers, non-white, or not full-time employed preferred walnuts.

## GENERAL

**Ralph Blaney and Richard Bennett**, The University of Reading, United Kingdom – *What price animal suffering? The role of economics in the farm animal welfare debate*

In addressing farm animal welfare issues, there are inextricable linkages between animal science, moral philosophy and economics. The approach adopted by economists depends upon the choice of ethical stance. The welfare of animals can be seen as important only as far as it affects human utility, its level being determined by its value to society relative to the value of farm animal products. If this ethical view is followed, further work using existing methodologies should result in adequate information on which to base decisions on the optimum level of farm animal exploitation. An alternative ethical view is that animal welfare is important in its own right, requiring that both human and animal preferences/utility be considered. Many experiments have been conducted to measure animal preferences using approaches akin to consumer demand theory. If the ethical premise that animal utilities have independent

value is considered valid, the challenge facing economists is to incorporate both animal and human preferences into an economic framework.

**Elias Dinopoulos and James Oehmke**, Michigan State University, USA – *A neo-Schumpeterian model of agricultural innovation and growth*

A neo-Schumpeterian model of agricultural research and endogenous growth addresses growth linkages, optimal financing of agricultural research and general equilibrium impacts of research. Results indicate private-sector overinvestment in non-agricultural research, systematic bias in partial equilibrium measures of research benefits and an alternative method for determining optimal research investment.

**Julio Garrido-Mirapeix**, Queen Elizabeth House, University of Oxford, United Kingdom – *Food security and the World Food Summit*

Following the World Food Summit (WFS) in Rome, organized by the Food and Agriculture Organization of the United Nations (FAO) in November 1996, food security is back on the agenda. The paper argues that there is likely to be much sympathy with the WFS goals, though the crucial question remains about the real impact of the summit in effectively reducing food insecurity in coming decades. Consideration of a number of issues (summit fatigue; conceptual, participatory and implementational issues; the commitment of FAO members) leads to a pessimistic view of the impact of the WFS Action Plans in terms of national household food security. It is suggested that additional research on a number of key food security areas is necessary before there can be any move forward.

**Luciano Gutierrez**, University of Sassari, Italy – *On the determinants of food consumer price inflation in open economies*

A simple two-sector model can be used to examine the determinants of food consumer price inflation in open economies. Starting from cost-push and monetary models, an eclectic model is formulated which allows for direct effects of cost factors plus imported inflation and money supply effects.

**T.M. Horbulyk**, University of Calgary, Canada – *The social cost of labour in rural development: job creation benefits re-examined*

Governments in developed and developing countries are attempting to implement policies which favour rural economic growth and simultaneously reduce existing unemployment, or underemployment, of labour. By referring to recent published examples, this paper shows that some analysis has not paid sufficient attention to the social cost of labour employed when job creation is pursued in the private or public sector. In specific instances, policy analysis has confused the social cost of labour with the distributional benefit potentially achieved through job creation. Correct analysis is important both in choosing alternative development proposals and in the choice of labour-intensive versus

capital-intensive technologies. The paper illustrates these issues using static, partial equilibrium analysis of labour market adjustment, with and without regional migration. When correctly conceptualized, the social costs and benefits of job creation policies can best inform a range of rural policy decisions.

**Douglas Horton**, ISNAR, The Hague, The Netherlands – *Assessing institutional impacts of an international organization: the case of ISNAR*

The poster illustrates how an international agency – The International Service for National Agricultural Research – has organized and conducted an evaluation of its achievements and its impacts on client organizations in developing countries. It presents the methodology used for the evaluation and the main substantive findings. It assesses the outcomes of the evaluation process, and draws lessons for future organizational assessment exercises.

**Oyvind Hoveid**, Norwegian Agricultural Economics Research Institute, Oslo, Norway – *Policy analysis when history matters: from temporary equilibria to intertemporal ones*

A theoretical model comprising learning is used to study the movement from temporary towards intertemporal equilibria. Such models are needed for policy analysis when the economy is not presumed to develop in a unique intertemporal equilibrium path.

**Michael Kirk**, University of Göttingen, Germany – *Challenges for future cooperation in developing countries*

As cooperative self-help has proved to be efficient in phases of rapid economic change, it is an interesting option for developing countries undergoing structural adjustment and/or transformation. Against the background of reduction of official intervention and divestiture, the paper explores the concepts of new institutional economics for use in the design of cooperative types of agrarian institutions.

**Maria de Belem Martins**, Evora University, Portugal – *The use of linear programming to support animal breeding programmes*

Numerous features contribute to the efficiency of animal production systems and the evaluation of their relative economic weight is important for success in animal breeding programmes. Although there are several studies of genetic improvements and of meat production systems, no attempt has yet been made to utilize bioeconomic models to quantify economically the effects of selection modification on technical coefficients. This is attempted in the poster.

**Severine Mateo and Daniel Deybe**, CIRAD/URPA, Nogent-sur-Marne, France – *Interactions between deforestation and capital accumulation: an analytical model*

Understanding deforestation processes is a challenge. In the region studied in the Ecuadorian Andes, farmers seem to arbitrate between deforestation to accumulate livestock and conservation of the forest for future uses. A dynamic analytical optimal control model is used to formalize this process in order to obtain theoretical growth paths within the farm.

**Ludwig Nellinger and Ralf Helbig**, Institute of Farm Management, Bonn, Germany – *Costs of machinery and farm structure*

The properties of cost functions in agriculture require a declining annual use of machinery of increasing age. As a result, a mixture of farm sizes and the trading of machines in a second-hand market becomes beneficial. The poster outlines the theoretical background and empirical results with respect to this issue.

**Ernst-August Nuppenau and Ousmane Badiane**, University of Kiel, Germany – *A model of agricultural transformation through policy reforms and public investment*

This contribution focuses on the modernization of agriculture as an intertemporal process which includes pricing policies. It describes a market-oriented policy that cares about public goods provision and investigates the potential for the complementary provision of public goods in infrastructure and farm technology. Increased knowledge and quality of farm operation due to public investments allow modernization to take place.

**Quirino Paris and Richard E. Howitt**, University of California, Davis, USA – *Dealing with scarce and incomplete information by maximum entropy methods*

In many fields of economic inquiry the available information may not be sufficient to allow estimation of the desired structure of a model by means of traditional econometric techniques. Maximum entropy methods can, however, deal with ill-posed problems (number of observations smaller than number of parameters) and ill-conditioned problems (multicollinearity).

**May Mercado Peters and Shahla Shapouri**, USDA-ERS, Washington, DC, USA – *Factors affecting income distribution and food security*

Income inequality is one of the major factors contributing to the severity of chronic undernutrition in low-income countries. The objective of this study was to identify the key factors affecting income inequality by estimating the relationship between the income inequality measure and selected economic and social variables. The results of the analysis indicate that increasing the rate of economic growth and the development of the agriculture sector will significantly reduce the degree of income inequality in low-income countries.



**E. Wesley F. Peterson and Siva Rama Krishna Valluru**, University of Nebraska, Lincoln, USA – *Agricultural comparative advantage and policy interventions*

International trade patterns are often explained using the concept of comparative advantage based on variations in factor endowments. Government intervention in agricultural markets may distort patterns predicted by relative factor endowments. This study tests the proposition that agricultural and environmental regulations offset the effects of factor endowments in agricultural trade.

**Punya Prasad Regmi**, Asian Institute of Technology, Pathumthani, Thailand – *Sustaining agriculture through ecostructuring: a holistic approach to strategy development*

Mounting population pressure has been creating economic and environmental problems and causing unsustainable development, particularly in Third World countries. Ecostructuring is a holistic approach to evolving strategies for sustainable development. Ecosystem capabilities and ecosystem governance are two fundamental aspects of ecostructuring.

**Stacey Rosen and Shahla Shapouri**, USDA-ERS, Washington, DC, USA – *Food security outlook for developing countries*

The paper attempts to project food availability and access in 60 lower-income developing countries (36 in sub-Saharan Africa, 4 in North Africa, 9 in Asia and 11 in Latin America) during the next decade. The results show that sub-Saharan Africa is the most vulnerable region in terms of both lack of adequate food supplies and the share of the total population affected.

**Guenther Schamel**, Humboldt University, Berlin, Germany – *Agricultural trade and the environment: domestic versus global perspectives*

Alternative environmental and trade policies are modelled, distinguishing abatement and output reduction. Terms of trade effects resulting from domestic/border policies determine optimality. Even without trade taxes, large importers (exporters) can raise their welfare by taxing production below (above) marginal external costs created, while subsidizing abatement above (below) marginal social damage avoided.

**Ulf A. Stolzke**, University of Kiel, Germany – *New approaches in commodity futures trading exercises: preparing students for changes in agricultural trade*

Kiel University offers Europe's first agricultural commodity futures trading exercise. Students from Western and Eastern European universities competing in a speculative game learn to use and evaluate commodity futures. Lectures given by scientists, speeches made by business people and the trading exercise prepare students to become decision makers in an agribusiness sector likely to be confronted by an increasing price risk.

**Bonny Sylvie**, INRA-ESR, Grignon, France – *New technologies in agriculture: are they a way to sustainability?*

Are new technologies (NT) in the position to make a positive contribution in promoting sustainable agriculture? The aim is to examine developments such as those in biotechnology and information handling for their potential effects, taking into consideration the different elements of sustainability in agriculture:

- environmental soundness: will NT lead to a greater respect for the environment and the preservation of resources?
- economic viability: will it be increased by NT adoption?
- sufficiency and quality of food: will NT improve the situation for everyone?
- social acceptability: will NT lead to acceptable forms of agriculture?
- equity: will disparities diminish or strengthen?

New technologies often appear double-edged since they may increase or decrease sustainability, depending on how they are used. With the development of ever more powerful tools, greater control is necessary. An essential condition for a sustainable development model is that technological progress does not widen the gap between those who have access to it and those who do not.

**Scott R. Templeton and Sara J. Scherr**, University of California, Berkeley, USA – *The effects of demographic change and related factors on hilly-mountainous land in developing countries*

Concern about environmental impacts are frequently expressed in debates about population growth in upland areas of developing countries. However, a review of more than 100 studies indicated that population change can lead to either decreases or increases in tree cover, erosion or conservation of soil on agricultural land, and degradation or enhancement of grazing areas. These polar outcomes are possible because people not only use land more frequently for production but also substitute capital- and labour-intensive methods for land-intensive ones. They also create property rights which increase the expected pay-offs from land-improving investments and production methods. Increases in local labour supply and demand, larger families and smaller land holdings are the microeconomic consequences of population growth inducing these changes. Our review indicates that population decline usually leads to degradation of agricultural and pastoral land and that better non-farm income opportunities have a similar impact. In both cases, higher labour costs are the reason, but improvements in these opportunities can also induce people to plant trees as a labour-saving strategy and enable them to finance investments in farming land. Property rights do not always affect investments as expected. What matters for sustainable land use is not only the number of producers but also what, where and how they produce. The challenge to researchers and policy makers is to understand and configure incentives for production which enhance human welfare as well as land quality.

**Detlef Virchow**, University of Kiel, Germany – *How to optimize the conservation of plant genetic resources in different property regimes*

In the last decade, the importance of natural resources for sustainable agricultural development has been increasingly discussed. More recently, the problem of erosion of genetic resources and its consequences for global welfare in general, and for agricultural and pharmaceutical production in particular, were introduced into the debate. Since the 1930s, systematic surveying, collection and conservation of plant genetic resources has been conducted; hence, by today, their conservation for food and agriculture is a complex international and national operation. While the political discussion is focusing on the issue of 'fair and equitable sharing' of benefits derived from the use of plant genetic resources for food and farming, an intensive analysis of the costs of conservation has been neglected. The aim here is to analyse conservation costs at the private, national and global level. Two basic scenarios are outlined and their overall cost impact is discussed.

## WESTERN EUROPE

**Stefan Bojnec and Cecilia Alexandri**, FAO, Budapest, Hungary – *The European Union and Eastern Europe: agricultural and food integration*

The costs of accession are likely to cause many problems for agricultural policy adjustment during the integration of central European countries into the Common Agricultural Policy of the European Union. It is suggested that there is likely to be convergence of agricultural policies on both sides which will be accompanied by a more global approach in an enlarged European Union.

**Ludo Peeters**, Limburg University, Belgium – *The use of the maximum entropy method to estimate input-output coefficients from farm business accounting data*

This paper applies the generalized maximum entropy (GME) method to estimate input-output coefficients from farm business accounting data. The GME technique uses Shannon's information measure as a basis for estimation and inference, and allows the introduction of additional consistency and/or calibration constraints on the system of equations. The performance of the GME method is compared with three other methods: ordinary least squares (OLS), Bayesian estimation and LP. The various methods are tested by using an empirical example based on a set of RICA data from beef/dairy farms in one particular region of the EU.

**François Colson and Vincent Chatellier**, INRA-LERECO, Nantes, France – *CAP reform and direct payments to French farms*

The aim is to examine the distribution of farm subsidies in France before and after the CAP reform and to evaluate the level of subsidies for three types of

farming by taking economic performance into account. A possible scenario for the limitation of direct subsidies per agricultural worker is tested.

**Michaela Hoffmann and P. Michael Schmitz**, Justus-Liebig University, Giessen, Germany – *Agriculture and the macroeconomy: modelling linkages using the VAR approach*

A vector-autoregressive system (VAR) and vector-error-correction model (VECM) are developed to capture the dynamic interactions between macroeconomic and agricultural variables in Germany. Impulse-response functions can portray the reaction of the variables to unexpected shocks. It is shown that there are inverse relationships between German food exports and a real revaluation of the Deutschmark (DM), and between the inflation rate and exports, though the interest rate has no clear influence. Producer prices for agricultural products are sensitive to shocks in the real value of the DM in spite of the agrimonetary system of the European Union and also tend to relate to inflation. Interest rates again have little effect. The performance of the food industry is very important for the agricultural sector as prices are increased markedly when a positive shock to food exports occurs. On a less aggregated basis, it can be shown that the livestock sector is more exposed to macroeconomic influences than plant production.

**Hiltrud Nieberg**, Institute of Farm Economics, Braunschweig, Germany – *Economic impacts of conversion to organic farming in Germany*

The Institute of Farm Economics monitors 107 farms which began their conversion to organic farming in the crop year 1990/91. The selected farms are scattered over the territory of former West Germany. In order to assess the structural and economic changes, the development of organic farms is compared annually with results of a similarly structured group of conventionally managed reference farms. After four years, a wide variety of changes can be observed. Because organic farming prohibits the use of chemical inputs, crop rotation and the cultivation of legumes becomes more important. Furthermore, the land use system depends strongly on the marketing possibilities of organically grown products. Livestock numbers show a declining trend, while labour requirements increase. In crop production, yields decrease strongly. At this point in time, higher prices can only be realized for plant products. The conversion to organic farming has led to positive income effects for the majority of farms. However, the profitability of organic farming depends largely on the extensification premium and the marketing possibilities for organic products.

**Benedetto Graziella and Pulina Pietro**, University of Sassari, Italy – *The role of agriculture in Italian local systems of production*

The intention is to present the early results of research on the role of agriculture within different territorial systems of production. Specifically, the characteristics of agriculture in so-called 'Industrial Districts' and in other local systems are compared, using a multivariate discriminant analysis applied

to data on population, industry and agriculture available in Italian census results. In Industrial Districts, agriculture and related activities make up only a small percentage of the labour force, many workers are over 55 years of age and there is concentration on cropping for local markets. Elsewhere, greater importance attaches to permanent crops (fruit, olives and vineyards, for example) more reliant on waged labour.

**Maroeska Boots and Jack Peerlings**, Wageningen University, The Netherlands – *Consequences of a two-tier price system for Dutch dairy farms*

The effects of a two-tier price system, as an alternative to the present milk quota system, are simulated. The main result is that farmers produce B-milk only if the price of B-milk – or the world market price – exceeds marginal production cost.

**Alison Burrell**, Wageningen University, The Netherlands – *The trade argument for eradicating Aujeszky's disease: effects of export restrictions on the Netherlands pig industry*

Market outcomes and pig producers' returns are simulated under different assumptions about the closure of export markets for live piglets and hogs. If The Netherlands failed to eradicate Aujeszky's disease before its trading partners, live piglet exports would be banned, reducing industry revenue and export earnings by 9 per cent and 10 per cent, respectively, in the medium term. If live hog exports were also banned, the reductions would be 26 and 32 per cent, respectively. Piglet producers are less severely affected than hog fatteners.

**Folkhard Isermeyer, Torsten Hemme, Claus Deblitz, Ron Knutso and John Miller**, Institute of Farm Economics, Braunschweig, Germany – *The International Farm Comparison Network (IFCN) technology and policy impact calculations for typical farms worldwide*

IFCN is a permanent international network of scientists, advisors and farmers which conducts farm-level economic analyses for policy makers, agribusiness and agricultural organizations. Dairy farm results include cost of production comparisons for dairy farms worldwide (12 countries in 1996), policy analyses of dairy farms in the United States, Canada and Mexico, and quota policy analyses of dairy farms in Germany, The Netherlands, the UK and France.

**Tassew Woldehanna**, Mekelle University, Ethiopia – *Farm household consumption and borrowing constraint: a test of Euler equations on Dutch farms*

Euler equations were derived from a constant relative risk aversion utility function for the total consumption expenditure, household expenditures and other expenditures (which includes that on durable goods). The equations were estimated using the method of three-stage least squares (3SLS). The results indicate that farm households are not optimizing utility of consumption in the

way suggested by the Euler equations. Households do not respond to income uncertainty and they are not constrained in borrowing. Instead, households are non-optimal and myopic, following a simple consumption rule based on their current income. The growth of family size has a significant influence on household expenditures, but not on the durable goods expenditure, implying that there are economies of scale in the consumption of durables. The growth of household expenditure and that of other expenditure are found to be complementary.

**Olvar Bergland**, NLH, Ås, Norway – *Valuation of landscape elements using a contingent choice method*

Agricultural activities provide important amenities for direct and/or indirect enjoyment by the public, plus environmental services to the economy such as waste receipt, wildlife habitat, recreation opportunities and biodiversity. Before making recommendations about optimal provision of these amenities, knowledge is required both of their economic value and of their production costs. Assessment of the economic value of changing landscapes must allow for multidimensional trade-offs in various attributes, which will require specialized methods. Changes to the contingent ranking method, which take into account some of the cognitive difficulties with ranking experiments and also address the reversibility paradox of ranking, are suggested. The methods are used for valuation of countryside amenities in Norway.

**Javier Calatrava**, Junta de Andalucia, Granada, Spain – *Economic marginality, social depreciation of agriculture and the disappearance of farming in depressed areas in south-eastern Spain*

Three effects of farming in the Alta Alpujarra have been analysed, namely, the abandonment of farming, farmers' relative welfare within the rural community and social regard for agriculture. Finally, some conclusions are drawn concerning the recent evolution of farming in the area and the factors determining farmers' resistance to marginality.

**Francisco Del Campo Gomis, Juan F. Julia Igual, Nigel Poole and Fernando Vidal Gimenez**, University Miguel Hernandez, Alicante; University Politecnica Valencia, Spain; Wye College, University of London, United Kingdom and University Politecnica Valencia, respectively – *Producer-buyer transactions in the Valencian citrus industry*

Transaction costs are endemic in the fresh produce industry because the technical and economic characteristics of the products give rise to high levels of uncertainty and the need for close control in the supply chain. This study uses a new institutionalist economics approach to investigate the citrus fruit industry in Valencia and to consider whether the use of contracts would facilitate producer marketing decisions, thus reducing uncertainty and transaction costs. The results suggest that, in addition to the negotiated price, marketing factors are important determinants of the terms of the transaction. Specifically, the

relationships between security and uncertainty and between trustworthiness and lack of confidence are more important than the negotiated prices. The work lends support to arguments for standardized citrus marketing contracts.

**Lucinio Judez**, Polytechnic University of Madrid, Spain – *Survey design for application of dichotomous choice contingent valuation to recreation in the 'Tablas de Daimiel' National Park*

A procedure is described for drawing up the sample for dichotomous choice contingent valuation of the recreational value of the park, using a truncated mean as a welfare measure. Data are used to analyse the accuracy (bias and variance) of the estimate of the welfare measure from different values and subsample size vectors.

**Joaquin Lombán and Joaquin A. Millán**, UPM/ETSEAL, Lleida, Spain – *Regional preferences in demand for meat and fish in Spain*

A diverse demand model illustrates regional differences in consumption patterns in Spain. There is particular emphasis on the use of Allais' coefficients to analyse the structure of substitution and complementarity.

**Albayrak Nursen**, Harper Adams College, United Kingdom – *Modelling agricultural output response: a time-series analysis with GARCH, cointegration and ECM techniques*

The provision of the 'right' price incentive to promote increased supply has been repeatedly emphasized in development literature and is an important concern to policy makers. The empirical evidence on supply response reflects developments made over time in econometric methodology, especially in time-series analysis. The main purpose is both to review existing information and to provide further empirical evidence on supply response to prices and risk. This will enable assessment of the importance of price variables on agriculture. The data used are from district level and the time period analysed is 1950–90. The empirical results confirm that the price mechanism has a role to play in the reduction of price risk and resource allocation and the case for a positive price policy for agricultural development is strong. However, instead of the price mechanism being regarded as the sole instrument to promote growth and efficient resource allocation, it is also concluded that further provision of technological change will stimulate output.

**Abigail Tiffin**, University of Durham, United Kingdom – *Measuring oligopolistic distortion in the UK frozen potato product sector: a calibration modelling approach*

This paper compares competitive levels in the UK and Dutch frozen potato product sectors over the period 1980–92, using a calibration model and conjectural variation analysis. Estimates are obtained of the trade and welfare effects of oligopolistic distortion in the UK frozen potato product sector.

## TRANSITION ECONOMIES

**Tanja Jaksch and Rosemarie Siebert**, Socioeconomic Institute, Munchenberg, Germany – *Agriculture and rural areas in Eastern Europe: extreme scenarios after the year 2000*

Two extreme scenarios describe the potential future, in the next millennium, of rural areas in eight selected countries, using 11 indicators (for example, agricultural production, population, unemployment, farmland area, importance of environmental protection). Delphi analysis is used to generate the scenarios.

**Hermann Lotze**, Humboldt University, Berlin, Germany – *Foreign direct investment in Central and East European food industries: a general equilibrium analysis*

Foreign Direct Investment (FDI) is expected to contribute significantly to the process of economic restructuring in Central and Eastern Europe. In this paper the combined effects of capital and technology transfers are modelled in a CGE framework. Factor movements, trade and growth effects are analysed.

**Marian Rizov**, Department of Land Management and Agricultural Development, Sofia, Bulgaria – *The problem of collateral in conditions of underdeveloped factor markets in the transitional economies of Central and Eastern European countries*

The large demand for investment credit in CEECs is likely to continue, simultaneously with the processes of banking reform and the consequent difficulties in meeting agricultural credit. Lenders also face considerable risks, since newly established farmers are difficult to rate, and bankers' expectations of positive net returns on loans can only be achieved by making default costly to the borrower or cheap to themselves. The viability of non-traded assets as collateral is explored (since creditors are willing to accept greater risk when the collateral is valuable to them) and will depend on the bank's ability to establish values placed on assets by individual debtors. A reliable forecast of future market values, however, is almost impossible in the underdeveloped CEEC land markets. Nevertheless, since such information asymmetries exist in most lending transactions worldwide, collateral should always be a necessary, but not a prime, consideration in lending.

**Ararat Y. Melkonyan and Tigran A. Melkonyan**, Iowa State University, USA – *Multiple uses of water: power, irrigation and amenity*

As in many countries, the Republic of Armenia has limited fresh water. Waters of Lake Sevan are used to generate power for irrigation, for industry and drinking. We present static and dynamic models of efficient allocation under institutional arrangements varying from rationing to a free market. Environmental impacts are analysed.



**Tomas Doucha**, Agricultural Economics Research Institute, Prague, Czech Republic – *Farm structure and farm managers in the transition period Czech Republic*

Czech farm structure, emerging after privatization, restitution and transformation, is dominated by large-scale farms such as cooperatives, joint stock and limited companies and private estates. Private farms, including family farms, occupy one-quarter of agricultural land. As a consequence of ownership fragmentation, the share of leased land is extremely high (70–100 per cent). About 500 000 hectares of state-owned land is being prepared for further privatization. The most serious problems are transformation debts and insufficient restructuring, applicable across each organizational type (transformed, restituted, privatized). The total rate of indebtedness reached 83.8 per cent in 1995. Future development strongly depends on adopting an agricultural policy which will prepare for accession to the European Union. Surveys which examine the behaviour of farmers and farm managers under the new conditions are being made to aid successful implementation of further reforms. The most conservation behaviour is that of collective farm managers who, whatever their personal feelings, aim in the main to preserve their powerful positions without causing social unrest on farms.

**Valdek Loko**, Institute of Agrarian Economics, Saku, Estonia – *The impact of liberal economic policy on Estonian agriculture*

After restoration of independence in August 1991 and the introduction of a new Estonian currency in June 1992, the country has been in transition, moving towards a market economy. The problems of transition in agriculture and the possible future scenarios of agricultural policy are examined.

**József Alvincz and Endre Tanka**, AKII, Budapest, Hungary – *The changing proprietary structure in Hungarian agriculture and food processing during 1990–95*

Outlining the main tendencies of agricultural privatization, the presentation covers three topics. A historical background analyses the basic facts and legal institutions of privatization. Secondly, the current position and expected trends of privatization are examined. Finally, the newest trends and issues affecting the privatized land use system are considered.

**Péter Halmai and László Velikovszky**, Gödöllő University of Agricultural Sciences, Budapest, Hungary – *The dilemmas and alternatives for agricultural market regulation in the transition countries: the Hungarian case*

This paper tries to clear up the sometimes mysterious, but at the same time quite real, disorders of agricultural economies under transition in Central and Eastern Europe. There may be reasons why short-term foresight, speculation, fluctuations of demand and supply, and cyclical or periodical over- or

undersupply are present in the system. There appears to be many similarities between the countries in the whole Eastern–Central European region.

**Sándor Mészáros**, Research and Information Institute for Agricultural Economics, Budapest, Hungary – *Analysis and projection of value and diversification of Hungarian agricultural and food exports*

Agricultural and food exports have a foreign exchange earning role in Hungary which assumes added importance because of the country's international debts. The annual growth rate of export value was 2.3 per cent in the period 1989–94, associated with shifts in product pattern. Projections assuming eight scenarios have been made up to 2005, the latest foreseeable date of accession to the European Union.

**György Neszmélyi**, AKII, Budapest, Hungary – *Development of the agricultural information system in Hungary*

The main tasks required to modernize the agricultural information system in Hungary are discussed. Development is to be implemented with the participation of AKII. A strategic plan for an elaborate agroinformation system includes three main fields: broad agricultural statistics, farm management analysis and market information systems.

**Sándor Somogyi**, Páte Georgikon University, Keszthely, Hungary – *Economic policy and competitiveness: a case study of the Hungarian food industry*

In Hungary, food production plays an important role in foreign trade and in supplying the domestic market. Based on stable COMECON exports, considerable state subsidy and a safe position on the home-market there was rapid development over a number of decades. The sudden collapse of COMECON, import liberalization and declining purchasing power have created a new situation. The suggestion here is that the reconstruction of the food sector should be based on improvement of competitiveness. Using Porter's approach, it is pointed out that a fundamental condition for increasing competitiveness lies in exploiting the possibilities, deriving from the present comparative advantage, more expediently.

**Benon Gazinski and Phillippe Burney**, Agricultural University of Olsztyn, Poland – *Transformation of Polish agriculture: a study of potato marketing*

The potato sector is challenged by the nature of Poland's transition towards a market economy and by increased international competition. Trends in cultivation, disposal, storage, processing and market organization are discussed. Clear signs of recovery after the initial shock of the collapse of the former system are observed.

**Steffen Noleppa**, Humboldt University, Berlin, Germany – *Agricultural policy making and policy-making support in transition countries: some lessons to be learned*

The paper focuses on policy making and the contribution of scientific policy advice regarding agriculture in transition. In view of inadequate theory, the problem of agricultural policy formulation is acute. For Russia, problems in agriculture and related policy approaches are evaluated. Finally, factors are discussed that hinder successful East–West cooperation in scientific agricultural policy making.

**Eric P. Thor, Olga Melyukhina, Renata Ianbykh, William E. Scott and Alexander Hristov**, Arizona State University, Institute for Economies in Transition, Russian Academy of Agricultural Sciences and Agland Investment Services – *Russian farm credit, rural finance and agricultural conditions*

Economic reforms in Russia led to dramatic changes in agriculture and in the farm credit system, with the latter having faced a number of serious shocks since 1990. The commercial banks serving farmers and agribusiness are attempting to adopt new credit mechanisms and to refocus their commercial, financial and social objectives. There are a number of credit mechanisms which could succeed, with some of them being provided by models which have operated in the past. However, changes are not going to come easily for a nation in which macroeconomic, financial and trade problems create serious obstacles. Discussions at the 1997 Gore-Chernomyrdin meeting highlighted these issues. Agricultural and agribusiness strengths and weaknesses across the different oblasts are also beginning to force regional changes. Despite problems, there are signs of restructuring, with the sale of Agroprombank to SBS-Agro being an indicator that we may be at the beginning of a new era in farm financing.

**Peter Wehrheim**, University of Kiel, Germany – *The Russian food marketing chain in transition*

Institution building in the Russian agricultural sector needs to be complemented by new downstream marketing institutions to make the food chain more efficient. This is particularly true for domestic food products, which often do not reach the consumer or do so only at non-competitive prices because of high transaction costs. Case studies on food marketing chains for three Russian oblasts are discussed. First, results indicate that Russian farms have generally diversified their marketing channels during transition. Furthermore, marketing chains used by farms differ by products and regions. Larger farms have the more varied arrangements. Items which need substantial further processing are sold via less diversified marketing channels. At the same time, many farms try to sell their products directly to the consumer. Generally, small farms are disadvantaged most by high transaction costs. It is shown that broad features such as path-dependence, uncertainty and cultural and psychological effects are major factors shaping change. Many institutional innovations indicate a lack of market principles and market openness. The dearth of coordination between federal and regional governments is another impediment to improvement in efficiency.

**Cecilia Alexandri**, Institute of Agrarian Economy, Bucharest, Romania – *The relation between the demand for food and incomes in Romania*

The demand for staple foods according to the distribution of real incomes among the main socioprofessional groups in Romania is analysed. The main aim is to estimate Engel curves for 15 staple foods. Relationships considered were linear, double-logarithmic, semi-logarithmic, log inverse and double-log inverse. The elasticity coefficients obtained, using the double-log and semi-log functions, are presented and discussed. The main conclusions are that (1) in wage earner households, the link between food purchases and incomes is very strong for all products except bread, milk and potatoes; (2) in farm households, income does not influence purchases in the case of all of those products which can be obtained within the farm; and (3) in both types of household, meat, citrus fruits and alcohol show high demand elasticities.

**Geetha Nagarajan and Richard L. Meyer**, Ohio State University, USA – *Determinants of firm growth in the transition economy of Romania*

An attempt is made to explain the recent growth, and the associated role of finance, in Romanian private firms. A composite score capturing the multidimensional aspects of growth was regressed upon several firm, entrepreneur and financial characteristics. Econometric results suggest that female entrepreneurs who own and operate only one business, particularly if it is located in Bucharest, achieve significantly higher growth. External finance did not positively influence firm growth, possibly because of cash flow problems and underutilization of assets obtained through loans. Options, such as leasing or renting assets rather than purchasing them, are suggested which could help during the early years of development.

**Vladimir Grbich**, Economics Institute, Beograd, Yugoslavia – *The future of part-time farming in Serbia*

The aim is to estimate the future development of part-time farming in Serbia. A shift in agrarian policy priorities, as well as high unemployment elsewhere in the economy, will prompt many people to engage simultaneously in more than one occupation, including part-time farming. Analysis of family farm behaviour suggests that investments in part-time farms do not lag behind those which are full-time. In addition, unlike the situation in some countries, part-timers have an important stake in farmland ownership and considerable potential for development.