

## AGRICULTURAL ECONOMICS

### Emerging trends in the consumption of livestock products: Implications for Research

Consumption of various livestock products in India has increased considerably over the last two decades. Per capita consumption of milk and egg almost increased by one-and-half times. Growth in per capita consumption of meat and fish was relatively low. There is a wide gap in the consumption rates of different food items between the rich and poor, and it is higher for milk, compared to meat and fish. This however has been narrowing down. Similarly, the gap in consumption levels of urban and rural population is also heading towards a convergence. A strong positive relationship exists between income and per capita consumption of livestock products. With sustained growth in rural incomes and reduction in poverty, demand for livestock products is expected to increase faster. This implies a need for faster growth in production of livestock products.

At present, productivity of Indian livestock is low compared to the world average. Average milk yield of Indian bovines is about 50% of the world average, and mutton yield is about 70% and pork yield is about 50%. This indicates that there is a considerable scope to raise the production through yield improvement measures. The emerging trends in meat consumption imply that the structure of meat production will gradually shift towards monogastrics (poultry and pig) with the rising per capita incomes. Research and development systems have to keep in view these trends while planning their activities.

- Demand for livestock products increased with improved rural income
- Coping mechanism was developed to reduce the impact of climate-induced natural disasters
- Integrated technology package developed for food security in tribal, backward and hilly areas
- A new mechanism is to be developed to protect farmers' income
- Regional trade agreements to be forged and potential sub-regional grouping to be identified to have mutually beneficial trade
- Dissemination of available technology needs more attention in future

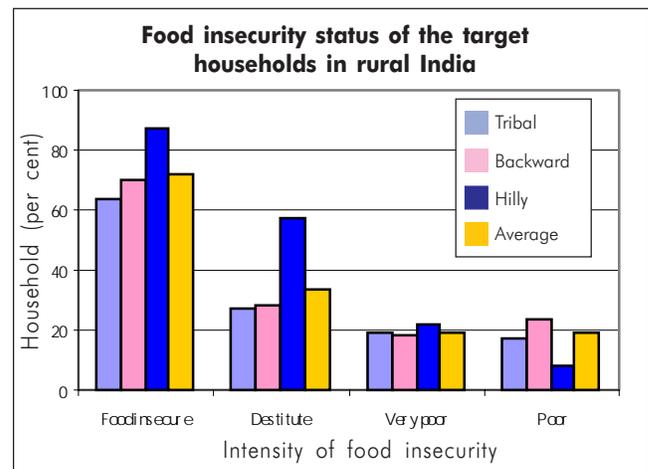
### Trends in the annual per capita consumption of livestock products in India

Commodity	(kg/person/year)		
	1980	1990	2000
Milk	40.4	54.9	66.9
Meat	3.7	4.5	4.5
Egg	0.7	1.2	1.5

### Technology intervention and food security status in tribal, backward and hilly areas

An integrated technology intervention approach under the Household Foods and Nutritional Security Project was followed to improve the food and nutritional security status of poor people of underprivileged regions of tribal, backward and hilly areas of India. The food security status of sample households was assessed on the basis of calories intake through food items consumed and it was compared with NIN standard. About 71% households faced food insecurity. On an average almost 33% households were destitute (poorest of the poor), followed by 19% each, very poor and poor. Hilly area is more adversely positioned in terms of calorie intake than that of backward and tribal areas.

In the backdrop of this situation, an integrated



(i) Destitute families (poorest of the poor);  $\geq 5000$  k calories deficit/family/day (ii) Very poor;  $\geq 2500$  to  $< 5000$  k calories deficit/family/day (iii) Poor;  $< 2500$  k calories deficit/family/day as per NIN standard



intervention of various technologies involving adoption of nutritional crops; improved practices of horticulture; improved breed, feed and health care of migratory sheep, piggery and backyard poultry; pen culture and carp polyculture in fishery, and post harvest management were initiated under NATP, and their initial impacts are assessed. Benefits-cost ratio is higher in minor millet namely *kutki* (2.99) at Jagadapur district, and *ragi* (1.80) at Ranchi. In migratory sheep in Himachal Pradesh, the benefit-cost ratio was 2.25. Pen culture and carp polyculture technologies in fishery have increased production and productivity by 194%. The overall benefit cost ratio is 2.5 and 1.87 for carp polyculture and pen culture, respectively.

### **Government Intervention in Food grain Markets in the New Context**

The government's procurement, distribution, and buffer stocking programmes during 1990s have had negative impact of repressing private food grain marketing, undercutting its potential contribution to long term food security. Attempts by the Commission for Agricultural Costs and Prices (CACP) to raise support prices of edible oils and pulses (in which India is deficit) relative to support prices for rice and wheat (which are in excess supply), may not necessarily result in shift of resources from rice and wheat to the deficit crops.

In the long run, India needs to develop new mechanism to provide protection to farmers' income. Government should provide support to develop viable crop insurance for protecting crop income. When the emphasis

of production is shifting from food security to market led production, it is not justified to base MSP on cost of production. One way to address this kind of situation is to compensate farmers through "deficiency price payment" a part of the difference between actual price received by farmers and MSP. The system of "deficiency price payment" can help in achieving economy in procurement and regional equity in implementing guaranteed price.

### **Regional Strategic Framework for Liberalization of Agricultural Trade Policies in Asia**

The challenge thrown by low level of international prices in the recent years to domestic production is being used to oppose the process of further integration and liberalization. Available evidence shows that reversing the process of liberalization and raising protection would be a big setback to Asian economies. Asian countries should face the challenge thrown by low international prices by improving efficiency and competitiveness of their produce. This requires strong commitments to undertake further reforms in trade and domestic policy. There is a need to identify domestic regulations that restrict markets and access to improved technologies and foreign capital, and replaces these with innovative and more open regulations. System of incentives to encourage efficiency and quality has to be put in place.

Asia as a region is showing economic dynamism and intra Asia agricultural trade is growing faster than world

#### **Vulnerability to climate change and coping strategies: Experiences of rural poor from Coastal Orissa**

Climate induced natural disasters (CINDs) like drought, flood and cyclone have become serious problems to Orissa, with regular occurrence particularly in coastal Orissa. The farmers and fishermen who are the traditional food producers living in such fragile environments have been ecologically, geographically and economically marginalized and among those, the poor are the worst affected. In most years, adjustment in household activities combined with relief works provides the minimal succours. Hence, the rural households have evolved certain coping mechanisms to reduce the impact of such CINDs.

The common strategies (in order) are :

- diversifying food and income sources;
- adjustment in crop practices;
- adjusting livestock keeping practices;
- risk minimization through share-cropping and building up stocks and inventories; seeking institutional support like demanding relief;
- managing scarce water resources; etc.

All such strategies have reduced the adverse impacts, but the poor continued to be the worst affected.

#### **Post T & V innovations in extension delivery in India**

Keeping in view the wide diversity in terms of agro-climatic conditions, socio-economic conditions of rural producers and infrastructure for agricultural development, a country-wide model for agricultural extension would be counter productive. Reform process in agricultural extension should consider the following key lessons that have emerged from an analysis of the post Training and Visit (T & V) innovations.

- The main public sector extension agency, the state Department of Agriculture, need to partner with a number of different organizations in the public and private sectors to access the wide range of skills related to business and market analysis, market development, value addition, community mobilisations and group formation.
- Districts need to be supported with skills and resources to develop extension plans. Organisational and management reforms are essential in public sector extension.
- Organisations should provide a greater degree of flexibility to field level officers at the block and circle levels.
- Group approach has a number of advantages, but farmer SHGs need to be supported technically and managerially to make them sustainable and economically viable organisations.
- Extension clearly needs more funding support.



trade. However, fast growth of intra regional trade in Asia has not been followed by any regional integration in the form of trade blocs. This is depriving Asia of vast potential benefits and opportunity for trade creation and improvement in welfare of Asian countries. Besides, regional trade agreements are also very effective mechanisms to take benefits and also to safeguard from much of the WTO commitments. It has thus become extremely important for Asia, in the globalising context, to forge regional trade agreements, and identify potential sub regional groupings for mutually beneficial trade.

### Impact Assessment of Technologies

A number of technologies are being refined, sharpened and developed under NATP. Impact assessment of these technologies would indicate early socio-economic impacts of projects under NATP. The results for few selected technologies like zero-tillage in wheat indicate that farmers are realizing significant economic benefits, whilst promoting sustainability of the production system. The work on impact of vegetable research also shows that a number of useful technologies have been developed, benefiting many vegetable growers in India. Rainwater harvesting in sub-mountainous regions has led to increase in wheat yield and also increase in cropping intensity with inclusion of tomato, which is highly remunerative, as an additional crop. High quality cotton variety (e.g. NHH 44, DCH 32) in cotton growing areas of Maharashtra and Madhya Pradesh, is more stress tolerant, eco-friendly (less chemicals are required) and produces high quality cotton fibre. Returns to investment in dissemination of available technologies are substantial, and should therefore receive due attention in future.

## AGRICULTURAL STATISTICS AND COMPUTER APPLICATIONS

### Research Achievements

In the study on development of GIS based technique for identification of potential agroforestry areas, important factors responsible for growth of agroforestry in Yamunanagar district of Haryana State were identified. Area under agroforestry was predicted for all the villages of the district using these identified factors. The district map with village boundaries was digitized and the predicted area under agroforestry were attached with the map so that area under agroforestry of any particular village can be seen by clicking on that particular village on the map. A GIS based technique named Objective Spatial Analytic Hierarchy Process was developed for identification of potential areas of agroforestry. An agroforestry suitability index map, depicting high, moderate and Low potential agroforestry areas, was obtained using this technique. A composite development index with respect to agroforestry at village level was developed. The village development index was compared with the suitability index of the village. Most of the

developed villages lie in the category of potential agroforestry villages. This study is useful for the farmers as well as planners.

In India the land use statistics are obtained as per 9-fold classification compiled with the help of village revenue agency, i.e. *patwari* in the temporarily settled states of the country, which cover about 86% of the geographic area. The National Statistical Commission while deliberating the means to improve the agricultural statistics of the country, recommended that crop area estimates be obtained on the basis of only 20% sample of villages. A study of land use statistics through integrated modeling using GIS was formulated to examine the use of remote sensing and GIS technologies in improving the agricultural statistics based on a sample of villages. The study was undertaken in the district Lalitpur in UP as this district has considerable area under most of the land use classification categories. Quality of revenue records was quite reliable. The land use statistics obtained through remote sensing were restricted to 5 classes, which could be identified using single date digital data. The land use statistics obtained through remote sensing were used as auxiliary information in spatial and non spatial models to predict the land use statistics of the (non sampled) remaining villages of the district. The results of the study showed that (i) the data quality of the records enumerated by *patwaris* were quite satisfactory, (ii) the prediction of area under different land use categories based on satellite data using spatial models was satisfactory, and (iii) the spatial models were found quite satisfactory at the village level. Hence, the land use statistics at small area levels like village panchayat/ blocks/tehsils can be easily developed using only sample of villages as recommended by the National Statistical Commission.

In a study on planning, designing and analysis of experiments relating to AICRP on Soil Test Crop Response (STCR) correlations, all the experiments were analyzed. In almost all the cases the response surface methodology produced the stationary point as saddle points i.e. neither maxima nor minima. In such cases exploration of the response surface in vicinity of stationary point was attempted. The optimal values of fertilizer nutrients N, P and K obtained by response surface methodology, was closely related to that obtained by targeted yield approach adopted by the STCR project. Thus one could advocate the adoption of the Targeted yield approach as was tested by sound statistical system of response surface methodology. The use of various regression diagnostics, which could be

- An agroforestry suitability index map depicting potential agroforestry areas developed
- Spatial models developed to generate land use statistics using remote sensing and GIS technologies
- Adoption of targeted yield approach was advocated
- *Agricultural Research Data Book 2003* was released



used in these experiments, was carried out for detection of outliers and the subsequent remedial measures were discussed in the report. The design of experiments division of IASRI was approached by the AICRP on Soil Test Crop Response, IISS, Bhopal, to propose a design, which includes the contribution of organics and bio-fertilizers along with inorganic fertilizers to study the relationship between yield of crop and added soil fertilizers for developing optimal and balanced fertilization recommendation to farmers. Subsequently a new design was proposed by the IASRI in which all the requirements could be met with a provision of incorporation of organic fertilizer. The QRT for STCR project has recommended this design and has expressed: “the design and the corresponding procedure to process the data may be discussed in the next workshop and adopted for future experimentation”.

### Software and Information System Development

The Institute has developed a Statistical Package for Factorial Experiments (SPFE 1.0). This software essentially generates the randomized layout of the designs, with or without confounding, for symmetrical and asymmetrical factorial experiments. The users have to define the set of independent interactions to be confounded for the generation of the design. Different sets of interactions and different number of independent interactions may be confounded in different replications. The package is also capable of generating regular fractional factorial plans for symmetrical factorial experiments. It also gives the analysis of the data generated from these designed experiments. For the analysis, the treatment combinations are written in lexicographic order and then renumbered from 1 to N, where N is the total number of treatment combinations in

### ***Agricultural Research Data Book 2003***

Agricultural research is a vital input for planned growth and sustainable development of agriculture in the country. The Council being an apex scientific organization at national level, plays a crucial role in promoting the accelerated use of science and technology programme relating to agricultural research and education. It also provides assistance and support in demonstrating the use of new technologies in agriculture.

The *Agricultural Research Data Book 2003*, which is seventh in the series comprises 211 tables, and eleven sections namely, Natural Resources, Environment, Agricultural Inputs, Fisheries, Horticulture, Production and Productivity, Produce Management, Export & Import, Indian Position in World Agriculture, Investment in Agricultural Research & Education and Human Resources under National Agricultural Research System (NARS). It also contains at the end, list of important National and International Institutions associated with agricultural research and education along with their addresses and contact points. The Data Book was compiled through the joint efforts of the Indian Agricultural Statistics Research Institute (IASRI) and the Computer Centre of the Indian Council of Agricultural Research.

### Training Activities

The Institute organised 26 training programmes/courses for 361 participants comprising officials of SAUs, ICAR Institutes and others, which includes 19 training programmes under Revolving Fund Scheme (RFS), 1 programme under Centre of Advanced Studies (CAS) and a short course on ‘Small area estimation techniques in agriculture’.



the experiment. The data generated are analyzed as per the usual procedure of designs for single factor experiments. Contrast analysis is then carried out to obtain the sum of squares of main effects and interactions. A null hypothesis on any other contrast of interest can also be tested. This package is also useful for teaching the subject of factorial experiments to the post-graduate students in the class. This can also be useful for the researchers in Statistics with interest in experimental designs particularly in factorial experiments. This package is user – friendly, interactive, Password protected, completely Menu-Driven and can also be operated using the TOOLBARS of SPFE. Complete Help with Index, Contents and Search facility is available. The package runs on WINDOWS Platform.

The following information systems were also developed.

- Integrated National Agricultural Resources Information System (INARIS) under NATP Project
  - National Information System on Agricultural Education (On-line Version)
  - Institutionalization of Research Priority Setting, Monitoring and Evaluation and Networking of Social Scientists (Sub-project under NATP, O & M)
  - (i) Project Information and Management System (PIMS) –standalone version and (ii) Project Information and Management System (PIMS) Internet version
- PIMSNET were developed and implemented. □