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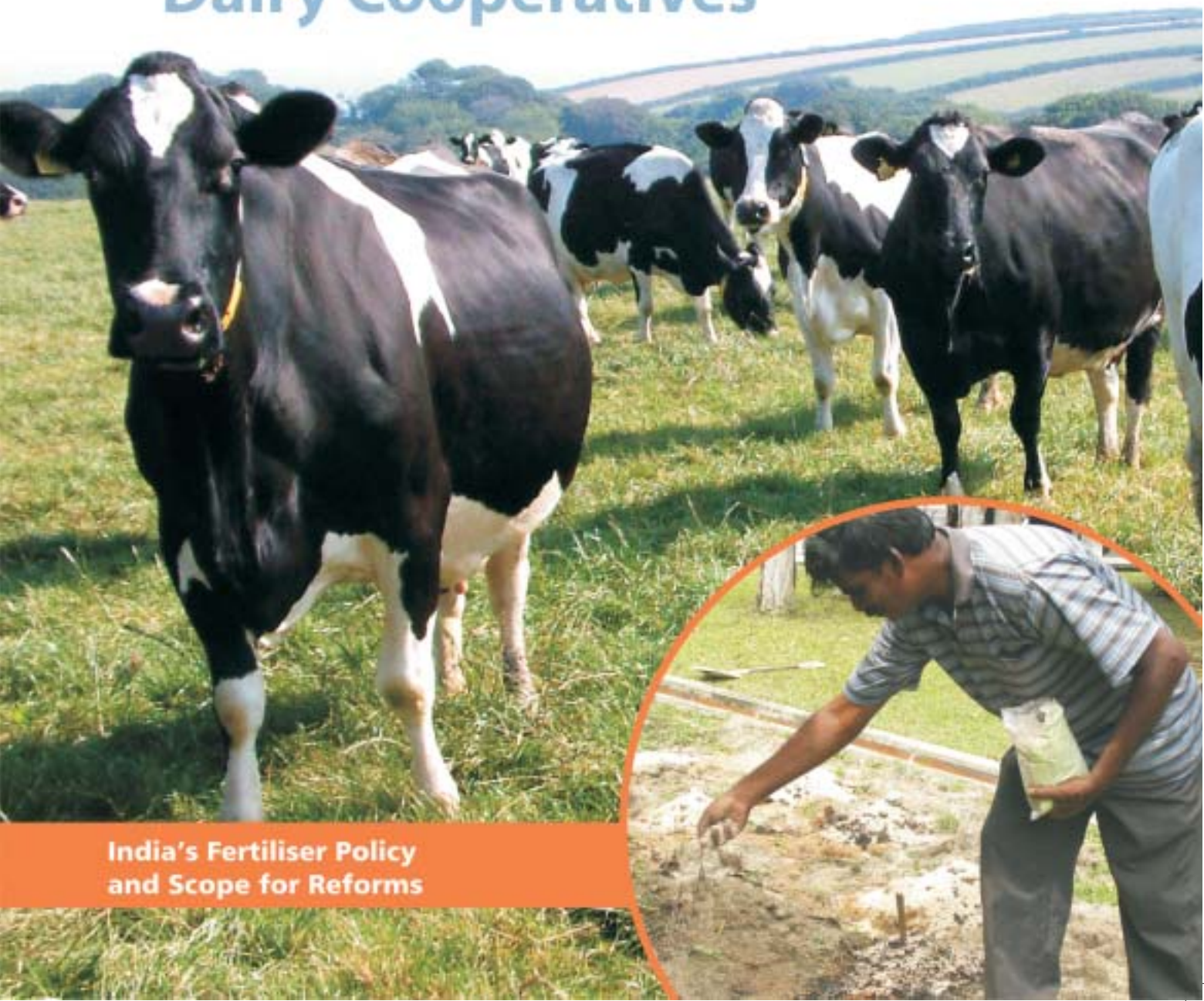
Reforms in the functioning of Dairy Cooperatives



India's Fertiliser Policy and Scope for Reforms

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EDITORIAL

Welcome to the September edition of *FINANCING AGRICULTURE*. In this, our focus area is Dairy Sector where the current scenario in milk production, capacity of primary producers, role of farmer producer organisations and other relevant stakeholders are discussed. Dairy farming has always been an income multiplier for the Indian farmer. And I am sure the articles will add to your information. The other articles in this issue, touch upon India's fertiliser policies; Rural Entrepreneurship opportunities in processing industries and on niche farming areas.

It will be prudent to reflect on the observations made by President Pratibha Patil on the agriculture sector. The President made these remarks while inaugurating the National Management convention in Kolkata. Calling for a fresh approach to enhance productivity and profitability in the farm sector, the President advocated more economies of scale in terms of production models in the farming sector; more effective distribution systems; reduced gap between the farmer and the end customer; and ultimately enhanced food security. The President also noted that industry partnering with agriculture, particularly in rain-fed areas can be a win-win option. She also appealed to the credit institutions and regulatory authorities for a synergised effort in this direction.

Good monsoon has kindled the hope for enhanced food grain production in the country. The reservoirs are full. The Union Agriculture Minister Sharad Pawar is already on record that India will witness a bumper food production. Even those left out of the bounty of monsoon has the Central government lending a helping hand. The Centre has announced a diesel subsidy package for farmers in drought-affected states of Bihar, Jharkhand and West Bengal to salvage the *kharif* crop by giving a subsidy of Rs 500 per hectare. This will be to meet for the additional cost they may incur in arranging irrigation.

Clearly there is more to look forward in agriculture and it is going to be action-packed in terms of new investments, technologies, innovations and other developments. And this publication will be bringing you the latest in all these developments. So, read on…

A.K. Garg
Editor-in-Chief

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Need for Reforms in the Functioning of Dairy Cooperatives

Time to hasten their transition into Successful Business Enterprises

By **Rattan Sagar Khanna***

Co-operative legislation has been a subject of intense discussion, debate and scrutiny from the day co-operatives were started in India. The first such law, the Co-operative Credit Societies Act, was passed in 1904. This was in response to a hostile reaction by a large number of farmers in Pune and Ahmednagar in Maharashtra against the unscrupulous moneylenders who charged exorbitant rate of interest on loans taken by the poor farmers to purchase inputs for cropping activities.

Since the Co-operative Credit Societies Act allowed registration of only credit co-operatives, a separate Co-operative Societies Act was enacted in 1912 to allow registration of other co-operatives. In 1919, co-operation became a state subject and since then, each province/state enacted a separate Co-operative Societies Act. After independence, the co-operative movement became an instrument for socio-economic development through democratic governance. The government adopted the co-operative movement as a policy for economic development and a balancing factor between the private and public sectors of the economy.

It is believed that the co-operatives set up during the 1950s came up purely voluntarily and continued to function with full autonomy. Those set up during the 1960s faced marginal government interference. During the sixties the governments provided financial assistance in setting up and promotion of co-operatives. Consequently, the governments perceived the co-operatives as their agent and assumed their control through legislation. Even the courts have been consistently considering the co-operatives, with honourable exceptions, as state or an organ of the state. The decisions of the courts thus legitimised the state control and interference.

Gradually, the registrar of co-operative societies became all pervasive. He could refuse registration of new co-operatives on the grounds that another already existed and the new one would be a threat to the already existing co-operative. He could register a co-operative even if there were no volunteers interested in that activity. Co-operatives were forced to get their accounts audited from the registrar's army of 'qualified auditors' appointed in

the department of co-operatives. Co-operatives could not wind up their business. They could only recommend to the registrar a need to liquidate.

The co-operatives promoted by people to fulfil their needs lost their voluntary nature. Those promoted by the government had members with no common business interest or sense of belonging. Such co-operatives became channels for the government to distribute credit, cheap and scarce resources. They became instruments for the political parties in power to promote their interests, objectives and perhaps a captive vote bank.

Co-operative Law

Reformation of co-operatives has been in tandem with socio-economic changes happening in the country and several committees have been set up to assist in restructuring of the co-operatives with time. Recommendations are available in the A. D. Gorawala Report 1954, Co-operative Policy 1959, Committee on Co-operative Administration 1963, Mirdha Committee 1965, Ardhanareeshwaran Committee 1985, Committee on Co-operative Law 1987, Brahm Prakash Committee 1991, Advisory Committee on Co-operation 1996 and the Alagh committee have recommended incorporation of co-operatives as companies and conversion of existing co-operatives into companies. The Government has also been requested to define their policy and encourage the role of autonomous, self reliant co-operatives, by fully exempting them from income tax, reducing incidence of double taxation when transactions take place between a member and its federal co-operative.

The government draws the powers for interfering in the functioning of co-operatives through the State Co-operative Act, rules and regulations. In 1991 the Brahm Prakash Committee had enlightened that "the essence of co-operative organisation is the principle of democratic management, signifying institutional regulation by members and their elected representatives in accordance with the bye-laws. It precludes control and interference by any agency including Government…" The Committee had identified the following restrictive provision in the State Co-operative Societies Act that empowered the Government/ Registrar to:

- Notify compulsory amendment of bye-laws
- Nominate directors on the Management Committee/Board of Directors
- Veto, annul, rescind resolutions of the Board/General Body
- Give any directives
- Supersede/suspend the Management Committee/Board of Directors
- Restrict the terms of office of office bearers
- Compulsorily amalgamate/divide the co-operative societies.

Clearly all the problems that hamper the efficient functioning of the co-operatives emerge from one common factor – the Government support. The support can be in the form of financial and/or management. It is a matter of perception as to how this support helps.

Let us take the case of financial assistance. If any person, leave alone the government, gives an assurance to the chief executive that the losses incurred by the business enterprise, he is heading, would be made up, notwithstanding the reasons of loss, the chief executive would have no reason to manage that enterprise efficiently and according to strict business ethics and principles. On the other hand when the government assures that the loss of the enterprise would be made from state resources, it gains legitimate right to give directives for unsuccessful working of the enterprise. Either way a foundation has been laid for inefficiency. There would a conflict when under such conditions the expectation is that the enterprise should make profit or at least pay for its own managerial expenses. By then it is too late.

The other is the management intervention. The assistance is generally in the form of appointment of chief executive from the civil services. There is a merit to it. Invariably, the executives from civil services have experience of managing large organizations as a generalist and it has advantages. It is possible to highlight many cases where

The co-operatives promoted by people to fulfil their needs lost their voluntary nature. Those promoted by the government had members with no common business interest or sense of belonging. Such co-operatives became channels for the government to distribute credit, cheap and scarce resources

the executives deputed from civil services have managed the business enterprise with success. The conflict arises when compared to other enterprises the dairy enterprise is considered as backward or of a secondary importance in the state and is generally the last preference for working.

Other is that the appointment to such position is for indeterminately brief periods. Priorities of the government in personnel placement invariably supersede the business needs of the co-operative as an enterprise. From frequent changes the organisation invariably suffers from continuous discontinuity of the chief executive. There is consequent breach in the policy statement, implementation of policy, style of functioning, reporting and communication. In fact the entire organizational behaviour undergoes changes so often that it suffers from severe schizophrenia. Such a discontinuation in top management negates an expression of the dairy co-operative being a business organization.

Dairy Co-operatives

Because the bye laws of the dairy co-operatives were modelled on those of 'Anand Pattern' at least the persons who were not in milk business could not make direct entry as members of the village dairy co-operatives. But the co-operatives at the district level and the state level were in no situation than their counterparts in other fields. Before the district and state co-operatives were incorporated the NDDB had insisted on educating the state co-operative officers and registrars so as to ease the registration of co-operatives. It turned out the other way. In many cases the registrars and the top level politicians found that if the district and state dairy co-operatives were registered in accordance with the model bye laws proposed by the NDDB, they would become far too autonomous for their comfort and out of bounds of their control. Commenting on such autonomy a chief minister told Amul fame Kurien, "Do you really expect me to let you set up a parallel government in my state to challenge my power and influence?"[1]

Continued lobbying by the well-meaning co-operators and politicians brought out some positive result for promoting 'true co-operatives'. In 1995 the Andhra Pradesh government decided to replace the existing co-operative societies act with a model co-operative act on the lines proposed in the Brahm Prakash Committee and by the Co-operative Development Foundation. It was realised that replacing the existing act would create difficulties for the very existence of the government-controlled co-operatives. The government therefore adopted a parallel act – the Andhra Pradesh Mutually Aided Co-operative Societies Act 1995 (MACS Act). The success of true co-operatives registered under the MACS Act encouraged other states to follow the path shown by Andhra Pradesh. Similar acts were passed in the states of Bihar, Chhattisgarh, Jammu and Kashmir, Jharkhand, Karnataka, and Madhya Pradesh.

The bye laws of the dairy co-operatives were modelled on those of 'Anand Pattern' at least the persons who were not in milk business could not make direct entry as members of the village dairy co-operatives

The autonomy granted by the MACS Act did not remain a fallacy. The advantages became clear in the performance of the Guntur District Co-operative Milk Producers' Union popularly called as the 'Sangam Dairy' after its registration under the MACS Act. The Sangam Union and its affiliated village co-operatives were originally constituted on Anand Pattern. The Sangam Union did suffer from the bureaucratic controls and political interference and gradually turned into a co-operative with poor performance that was losing the support and the confidence of its member milk producers. In 1997 the Union switched its registration from the old co-operative societies act to the MACS Act. The NDDB facilitated the conversion to the MACS Act by waiving the requirement of a government guarantee for repayment of loan given under Operation Flood. The new found autonomy, accountability to its members, policy directives from the democratically elected board of directors and the freedom to its professional managers to perform made the Sangam Dairy improve its achievements and financial results (Table 1)[2] and continued to perform better.

The adoption of the mutually aided co-operative societies act by the Andhra Pradesh government, and similar acts passed by many other states, was a revolutionary step and opened vistas for a new generation of co-operatives to be formed and to function on the principles of co-operation pronounced by the ICA.

Table 1: Performance of Sangam Dairy Pre- & Post-Registration under MACS Act

Performance Indicator	1996-97 (Under Old CS Act)	1999-2000 (Under MACS Act)
Milk procurement	46,900 tonnes	62,600 tonnes
Amount paid to producers	Rs. 46 crore	Rs. 72 crore
Price paid to producers for milk	Rs. 9.83 per kg	Rs. 11.54 per kg
Net profit	Rs. 2.5 lakh	Rs. 11.2 lakh
Price difference paid to producers	Rs. 0.20 per kg	Rs. 0.35 per kg

The Gujarat Co-operative Milk Marketing Federation which in 2007-08 had crossed a turnover of Rs. 5,247 crore. It has secured best export award nine times in a row. It owns the best food brand in the country. It is giving sleepless nights to multinationals in the field of marketing milk products and ice cream

Dairy Co-operatives as Business Enterprises

To any solution, underlies the recognition of the problem. First, there is need to admit the problems that have been identified by the experts. In his keynote address that Dr Kurien delivered at the *'Symposium on Socio-Economic Impact of the Operation Flood'* organised by the Indian Dairy Association at Bombay in 1983, he stated, "The Federation has amply proved that co-operatives assisted by competent professional managers can attain levels of achievement far surpassing that of many an established enterprise in the Indian corporate sector. The competence displayed by the Federation should demolish all too frequent criticism of co-operatives that their divided and shared management prevents the attainment of the highest achievements in production and marketing." This sums up the principles of management for the dairy co-operatives.

In his keynote address the Federation referred to is obviously the Gujarat Co-operative Milk Marketing Federation which in 2007-08 had crossed a turnover of Rs. 5,247 crore. It has secured best export award nine times in a row. It owns the best food brand in the country. It is giving sleepless nights to multinationals in the field of marketing milk products and ice cream. It has helped many a co-operatives within and outside Gujarat in financial performance and management practices. And it has never received any 'financial or management assistance from the government'. If at all any financial assistance has come from the government it has proved that the structure of the GCMMF is more responsive. Assistance was granted because the government trusted that the utilisation of those funds would be for the identified purpose and would go directly to the identified beneficiaries.

There could be an argument that success in this case was because the GCMMF had the desired autonomy and the financial support from birth. Reviving a sick dairy co-operative would be if not impossible, a very daunting task. Agreed, daunting it is. But a day has to be called a zero day to make a good beginning. There are examples of the sick co-operatives of Punjab, Rajasthan and Karnataka that have been brought out of almost moribund condition.

Policy Shifts

There is need to reconsider such policy changes as may help the co-operatives behave as true business enterprise. Grant them the autonomy to recruit at all levels including the chief executive; decentralise the staff to each legally independent unit and sever their linkage to the government structure of salary, personnel rules and regulations, let them pay and be governed in accordance with their capacity to pay; gradually withdraw the financial support given to offset losses, let those units close that find it difficult to survive for want of procurement of milk; withdraw any financial support unless the government considers the co-operative as an agency better suited than any other in delivering the objective of the financial grant; let inter-union transfer of milk and products be governed by business requirement and not based on directives; emphasise that procurement, processing and marketing of milk and milk products is a business and not charity; create avenues of value addition to milk rather than follow a passive and soft approach of procure and sell as pasteurised milk; improve the quality of products to meet with international competition; encourage co-operative to co-operative exchange of business, transfer of technology, and processes of learning, training and upgradation of its business systems.

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[1] Ruth Heredia 1997 Amul India Story

[2] Rama Reddy (2001) Background Papers 14th Indian Co-operative Congress

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** The Writer is a former consultant with the Department of Animal Husbandry, Dairying and Fisheries, Government of India*

OVERVIEW OF INDIAN DAIRY FARMING

Fair Price to Farmers: Still a Long Way to Go

By **G. Kalyan Kumar ***

The Indian Dairy Industry has come a long way since Independence with a huge capacity in terms of number of modern milk plants and product factories. India's dairy industry is considered as one of the most successful development industry in the post-Independence period with the total milk production in the country crossing 110 million tonnes in 2010.

In 1965, National Dairy Development Board (NDDB) was set up with the object of meeting the demand for milk, especially in urban areas. In terms of global share, India contributes only five percent of the total milk produced in the world.

Strengths

India has the highest livestock population in the world and accounts 50 percent of the buffaloes and 20 percent of the world's cattle population, most of which are milch cows and milch buffaloes. The total milk processing in India is around 35 percent of which the organised dairy industry accounts for 13 percent while the rest is either consumed at farm level, or sold as fresh, non-pasteurised milk through unorganised channels.

The organised dairies are in commercial production of pasteurised bottled milk and western and Indian dairy products. With the arrival of technology that affords protection of milk during transportation, it became possible to locate dairies where land was less expensive and crops could be grown more economically. In India, the market milk technology commenced in 1950, with the functioning of the Central Dairy of Aarey Milk Colony, and milk product technology took roots in 1956 with the establishment of Amul Dairy, Anand.

Organised milk handling started in India with the establishment of Military Dairy Farms. Long distance refrigerated rail-transport of milk from Anand to Mumbai started in 1945. Pasteurisation and bottling of milk on a large scale for the organised distribution started at Aarey (1950), Calcutta (Haringhata 1959), Delhi (1959), Worli (1961) and Madras (1963). More Milk Plants got established under the Five-Year Plans all over India.

These were taken up with the dual object of increasing milk consumption nationally and ensuring better returns to the primary milk producer. The aim was to produce more, better and cheaper milk.

Dairy Co-operatives

During the pre-independence period, cooperative movement was confined to a few pockets of Kolkata, Madras, Bangalore and Gujarat. The most notable in this venture was Kaira District Co-operative Milk Producers' Union Limited of Anand, Gujarat. After independence, the Government took initiative in setting up new Dairy Co-operatives in many parts of the country.

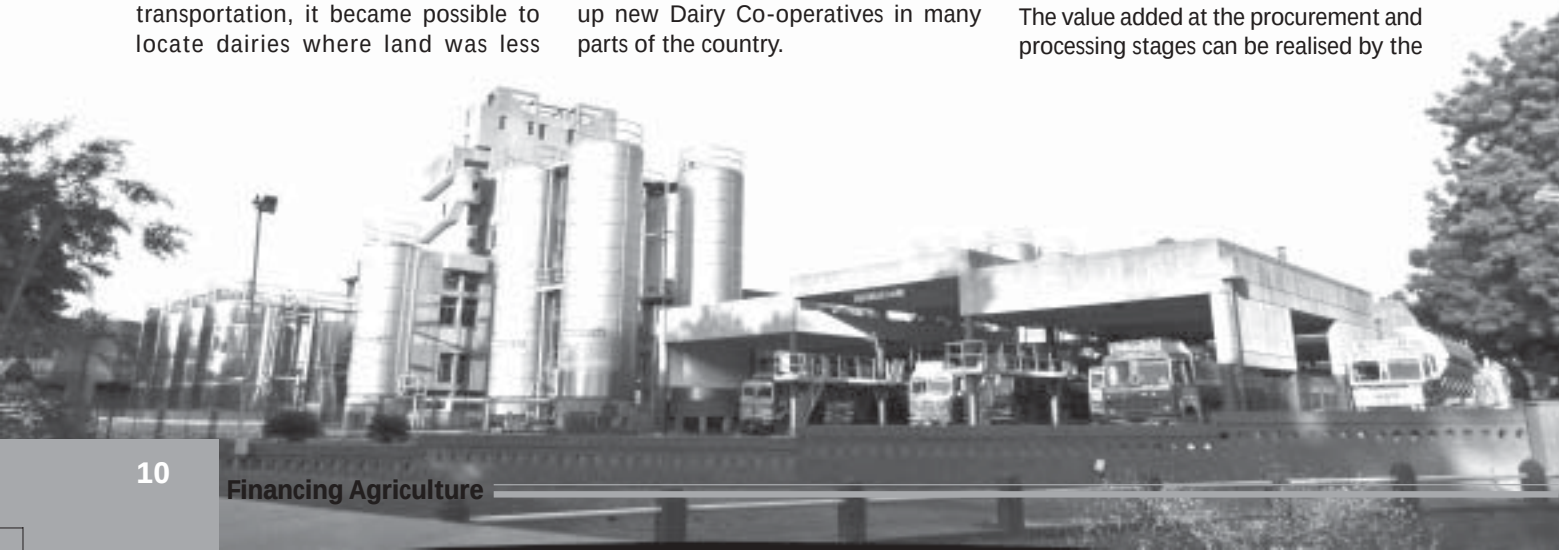
The dairy cooperatives account for the major share of processed liquid milk marketed in India. Milk is processed and marketed by Milk Producers' Cooperative Unions, which federate into State Cooperative Milk Marketing Federations. Over the years, several brands have been created by cooperatives like Amul (GCMMF), Vijaya (AP), Verka (Punjab), Saras (Rajasthan), Nandini (Karnataka), Milma (Kerala) and Gokul (Kolhapur).

The milk surplus states in India are Uttar Pradesh, Punjab, Haryana, Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. The manufacturing of milk products is concentrated in these states due to the availability of milk in huge quantity.

Procurement, Processing, and Marketing

In the cooperatives, the primary milk producers govern the entire federal cooperative structure and ensure that the higher-tier serves the purpose of the lower levels and that the gains at all levels flow back to the milk producers in a significant measure. The core feature of the Anand Pattern model is farmer control of the three stages following production, that is, Procurement, Processing, and Marketing of milk and milk products.

The value added at the procurement and processing stages can be realised by the



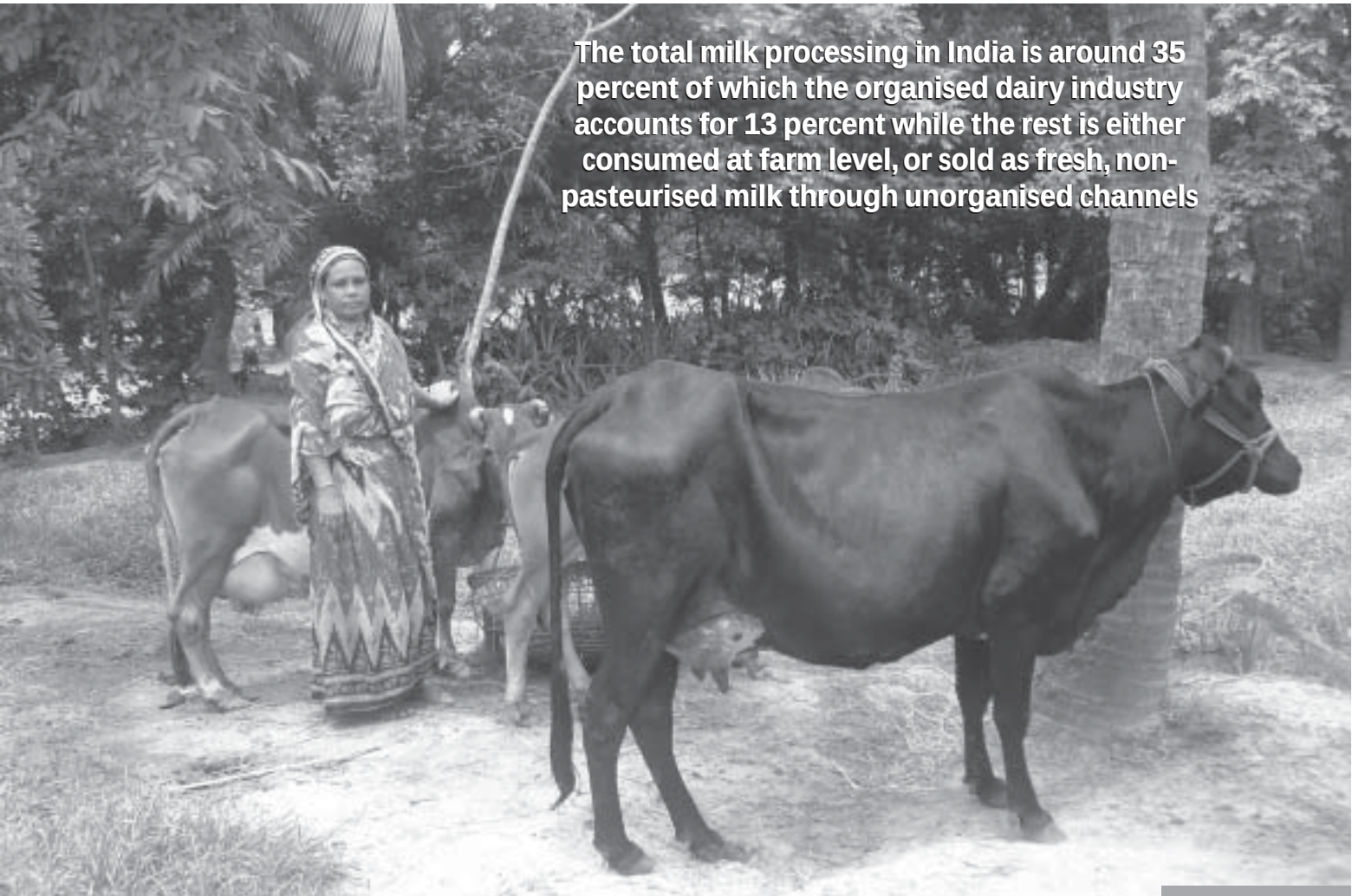
cooperatives only through control over marketing, which is therefore an essential requirement for success. By cutting out the need for middlemen in procuring and selling milk, the Anand pattern cooperatives helped to reduce seasonal price variations and enabled the farmers to enjoy the fruits of their labour instead of surrendering most of the profit to exploitative middlemen.

The dairy cooperative network is owned by nearly 12 million farmer members. These producers are grouped in nearly 1, 08, 574 village-level dairy cooperative societies.

The societies are grouped in 170 district-level unions spanning 338 districts. The unions make up 22 state-level marketing federations.

Anand Pattern

The Anand Pattern emphasised keeping cattle in the hinterland and transporting milk to cities by farmer cooperatives, rather than transporting cattle as well as fodder to cities. Thus the system had strong comparative advantage. The early dairy unions in Gujarat – such as Kaira, Mehsana, Sabarkantha, Banaskantha, and others rapidly emerged as large and successful farmer



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Achievements of Operation Flood, 1970–2002

Indicator	OF phases			Post-OF phase
	Phase I	Phase II	Phase III	
Date started	July 1970	October 1979	April 1985	April 1996
Date concluded	March 1981	March 1985	March 1996	March 2002
Investments (Rs. million)	1,165	2,772	13,031	
No. of federations/apex milk unions				
operating	10	18	22	22
No. of milk sheds covered	39	136	170	170
No. of dairy cooperative societies set up (thousands)	13.3	34.5	72.5	74.3
No. of members (millions)	1.75	3.63	9.26	11.06
Average milk procurement (million kg/day)	2.56	5.78	10.99	17.60
Liquid milk marketing (million litres/day)	2.79	5.01	10.02	12.67
Processing capacity				
Rural dairies (million litres/day)	3.59	8.78	18.09	26.47
Metro dairies (million litres/day)	2.9	3.5	3.88	NA
Milk drying capacity (mt/day)	261.0	507.5	842.0	990.0
Technical inputs				
No. of Artificial Insemination centres (thousands)	4.9	7.5	16.8	22.0
No. of AIs done (million/year)	0.82	1.33	3.94	6.00
Cattle feed capacity (thousand mt/day)	1.7	3.3	4.9	5.2

organisations, with hundreds of thousands of members dominating the economies of their domains.

However, Cooperatives today handle just 8 per cent of India's total milk, with their average procurement of 247.18 lakh kg per day (LKPD) in 2008-09. It is almost half of the 488 LKPD target under the NDDB's '*Perspective 2010'* plan.

The limited success of the cooperatives in the North and the East has, further, not been counterbalanced by a robust private sector, for which the prevailing model of milk procurement is largely responsible. The milk that private dairies source typically comes through three levels, starting with the village agent who buys from farmers and handles 200-300 litres a day. This milk goes to a bulk vendor, who collects 3,000-odd litres from many agents. At the third stage is the contractor, who, after aggregating and chilling up to 40,000-50,000 litres, transports it to the dairy. Milk with 6.5 per cent fat delivered at the gates of dairies for about Rs 23 a litre would not cost more than Rs 17 at the farmers' end.

Sector Highlights

- Bulk vending saves money and conserves the environment.
- Milk travels as far as 2,200 kilometres to areas of shortage, carried by rail and road milk tankers.
- India produces 95 per cent of its own dairy equipment, saving valuable foreign exchange.
- The annual value of India's milk production amounts to about Rs.880 billion.
- Dairy cooperatives generate employment opportunities for about 12 million farm families.

Amul Advantage

Players like *Amul*, *Nandini* or private concerns such as *Hatsun Agro* follow a vertically integrated model of direct, round-the-year procurement. For them, the cost of collection, chilling and transport from the farm-gate to the dairy-gate does not exceed Rs 1.50 a litre, allowing farmers a greater share of the cake.

For Example *Amul*, would be paying its farmers roughly Rs 350 for every kg of fat this year, after adding Rs 30-40 of bonus from distributed profits. At Rs 350, the farm-gate price for full-cream milk (containing six per cent fat) would come to Rs 21 a kg or Rs 21.6 a litre. But even after paying this price and incurring a transport expense of Rs 1.70-1.80 all the way from Mehsana in Gujarat, Amul is able to sell the same milk in Delhi at Rs 28 a litre.

Direct Procurement

Direct procurement is the way out for farmers to get a fair price over outsourcing model that may deprive farmers of a fair price and the end consumer good quality milk too. It is hoped that intervention of more dairy farming producers' organisation will ultimately help the farming community a better price and effective sustenance.

**The Writer is Editor of Financing Agriculture*

Livestock Rearing as a Strategy for Inclusive Economic Growth

By **Gavin Wall and Tinni Sawhney***

A review of the implementation of many livelihood improvement projects in India highlight two facts: firstly, a large number of households in rural India depend on livestock rearing as an important source of secondary income. Secondly, investments in dairying, small ruminant and poultry rearing have tended to yield the best returns for small and marginal farmers. This is further evident in the rate of growth of the livestock sector as it has comfortably outstripped the growth of many other agricultural sectors.

When we think of the goal of inclusive growth, we should not forget that from equity and livelihood perspectives, livestock rearing must be at the centre stage in poverty alleviation programmes. Concepts such as inclusive growth and poverty reduction are alluring and captivating; the need to strive to achieve high growth and at the same time ensure the poor and marginalised segments of society benefit and participate in this economic growth is an easy idea to accept, but it is one that is clearly proving to be very difficult to achieve.

New Initiative

If raising livestock can be a pathway out of poverty, what are the impediments to inclusive growth through the livestock sector? Towards addressing this and other related questions, FAO is pleased to collaborate with the National Dairy Development Board (NDDB) in a joint initiative called the *South Asia Pro Poor Livestock Policy Programme* with the objective of facilitating and contributing to the development of pro-poor livestock policies and programme implementation.

Priority activities include the identification, documentation and dissemination of approaches and practices that benefit small-holder livestock rearers detailing lessons learnt from these practices, and presenting issues for policy dialogue. The programme focuses on three core sectors – the development and management of common grazing lands; small-holder poultry rearing and small ruminant rearing. Based on emerging lessons from the documentation of approaches impacting small-holder livestock rearing some of the critical impediments to inclusive growth in livestock sector are:

- Access to common grazing lands by livestock dependent communities, particularly the poorest who often do

Engine of Agricultural Growth

Livestock rearing is a key livelihood and risk mitigation strategy for small and marginal farmers, particularly across the rain-fed regions of India. Livestock products comprised 32 percent of the total value of agriculture and allied activities in 2006-07 which was a noticeable increase from 27 percent in 1999-2000 and from 1980-81 when it represented 14 per cent of the agricultural gross domestic product. The livestock sector has therefore been growing faster than many other sectors of agriculture and if this trend continues then the sector will be the engine of growth for Indian agriculture that many have predicted.

Most often we see livestock as providers of essential food products, draught power, manure, employment, household income and export earnings. However, it is a very important fact that livestock wealth is much more equitably distributed than wealth associated with land. Thus, when we think of inclusive growth, we should not forget that from equity and livelihood perspectives, livestock rearing must be at the centre of the stage in poverty alleviation programmes.

There are two important aspects: firstly, livestock rearing at the household level is largely a women-led activity, and therefore income from livestock rearing and decisions related to management of livestock within the household are primarily taken by women. Interventions in India have demonstrated that support for livestock rearing has contributed significantly to the empowerment of women and an increasing role in decision making at both the household and village level. Secondly, livestock rearing, particularly in the rain-fed regions of the country, is also emerging as a key risk mitigation strategy for the poorest. They face increasingly uncertain and erratic weather conditions which negatively impact crop productivity and wage labour in the agriculture sector.

Three Messages

A global analysis of the livestock sector by the U.N. Food and Agriculture Organisation (FAO) was contained in the recently released *State of Food and Agriculture* Report and it highlighted three overarching messages that merit discussion in the context of India.

Although livestock products make important contributions to food security and poverty reduction for low-income rural families, the policy and institutional framework in many countries has failed to serve the needs of these poorest households and to get them onto the conveyor belt of development. The lack of public services in animal health to reach out to the poorest in rural areas and a failure to link small holder livestock keepers to better paying markets are two examples of common failings. The institutional and policy frameworks tend to support intensive and commercial livestock rearing, both in the provision of services and also in facilitating access to markets.

Second, livestock producers, including traditional pastoralists and smallholders, are both victims of natural resource degradation and contributors to it. Corrective action most likely lies in a mix of public goods related to environmental protection, ecosystem services and through incentives for private investment to improve animal productivity, particularly in remote regions. In the case of India, there are numerous examples of community-led interventions where community management and sustainable use of natural resources has positively impacted small holder livestock rearing.

Third, animal health services not only combat animal diseases that cause mortality and reduce animal productivity, they also protect human health because of the risk of animal to human disease transmission. Animal health systems have been neglected in many parts of the world and this has led to institutional weaknesses that in turn lead to poor delivery of animal health services and higher risks to livelihoods and human health. In correcting this situation it must be recognised that the poor face different risks and have different incentives and capacities to respond than do intensive commercial farmers. Therefore, animal health service providers have the additional challenge of recognising the differences between their stakeholders and developing mechanisms to reach them all.

Moving forward on these key findings is not possible by relying either on individuals alone or a single string of actions. Progress requires attention from all actors in the social, environmental, animal health, human health and agriculture sectors; that means public, private and community organisations being actively engaged together. The livestock sector is far too important to accept anything less.

Courtesy: UN Information Centre for India and Bhutan.

not own land to cultivate fodder linked with the management and sustainable use of these lands by these communities. For rainfed regions of the country, where small-holder livestock rearing is a key livelihood activity there is almost total dependence on these lands.

- It is axiomatic that further growth of the livestock sector will rely on improving the productivity of these lands, and on facilitating community led initiatives for management to prioritise the needs of small-holder livestock rearers. In the current scenario of rapid economic growth, common grazing lands are often the first to be allocated for the establishment of SEZs and other development and infrastructure priorities, without adequate understanding of the critical importance of these lands to the livelihoods of the poor.

Healthcare for Livestock

If the poor have to participate and benefit from the opportunities provided by a rapidly expanding market for livestock products, there is need for the establishment of effective and efficient animal healthcare systems that reach out to small-holder and marginal farmers. Such systems need not be driven by subsidies and grants. Experience has demonstrated that even the poorest are willing to pay for efficient health services for their livestock, provided these are available when needed. The South Asian region, including India, demonstrates a number of approaches of decentralised health care systems for livestock, that are worthy of replication on a larger scale.

Further, small-holder livestock keepers face barriers that limit their access to the expanding market for livestock products. It is obviously easier for larger commercial farmers to meet the volume and quality expectations of the value chains that connect to consumers with the ability to pay for livestock products. Many commentators point to the need for organisation and the collectivisation of small-holders to aggregate quantities and act as a vehicle through which small and marginal livestock keepers can link to these rapidly expanding markets. However, there is also a need for alternative marketing channels as competition will drive the creation of efficiencies which will increase the returns to all farmers.

Removing these impediments to inclusive growth through the livestock sector requires more than just additional investment. It requires first the recognition that the contribution of small-holders is critical to economic development. Eliminating the barriers mentioned above requires a mix of alternative institutions, improved production technologies and enhanced social capital. These barriers will not be overcome unless there is a genuine willingness to 'walk the extra mile' to achieve inclusive growth.

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Challenge of Doubling Milk Production in India

By **A.V. Tak and V.B. Tak ***

The big strides in milk production made in the last four decades have catapulted India to a leadership role in global milk production. India's *White Revolution* was associated with a sharp increase in milk production. During 1964-65, Intensive Cattle Development programme (ICDP) was introduced in the country in which a package of improved animal husbandry was given to cattle owners for promoting white revolution in the country. India stands first in the world in milk production with USA occupying the second place in the world.

Later on, to accelerate the pace of *White Revolution* a new programme named '*Operation Flood'* was introduced in the country. The latter is the world's largest integrated dairy development programme that made considerable progress in achieving its outlined objectives. During 2006-07, 100.9 million tonnes of milk were produced in the country.

Dr. Varghese Kurien is the pioneer of *Operation Flood* in India. All credit for its implementation and successful operation goes to him only. It was started in 1970 by National Dairy Development Board (NDDB). The programme completed its third phase in April 1996.

Main Issues

Despite reasonable achievements, there are many areas of concern that constrain realisation of full potential of this sector. The structure of population is one such issue. Despite significant advances in livestock breeding, the population structure continues to be dominated by local breeds. According to the 1992 Livestock Census, crossbred comprise only 7.5, 4.8 and 14.5 percent of cattle, sheep and pig populations respectively (Table 2). Only one-third of the poultry population represents improved breeds.

Second issue relates to the organisation of production system. In general the system of production is extensive in nature despite technological dualism (Table 2). The system of dairying in and around the urban areas is based on improved breeds and intensive input use. The rural system of production is characterised by low input and low technology. It is apprehended that technological change and commercialisation will further accentuate this divide.

Meat production is constrained by lack of productivity augmenting technologies and socio-religious taboos. Breeding efforts are yet to capitalise on the genetic stock of the indigenous breeds. The yawning gap between the existing

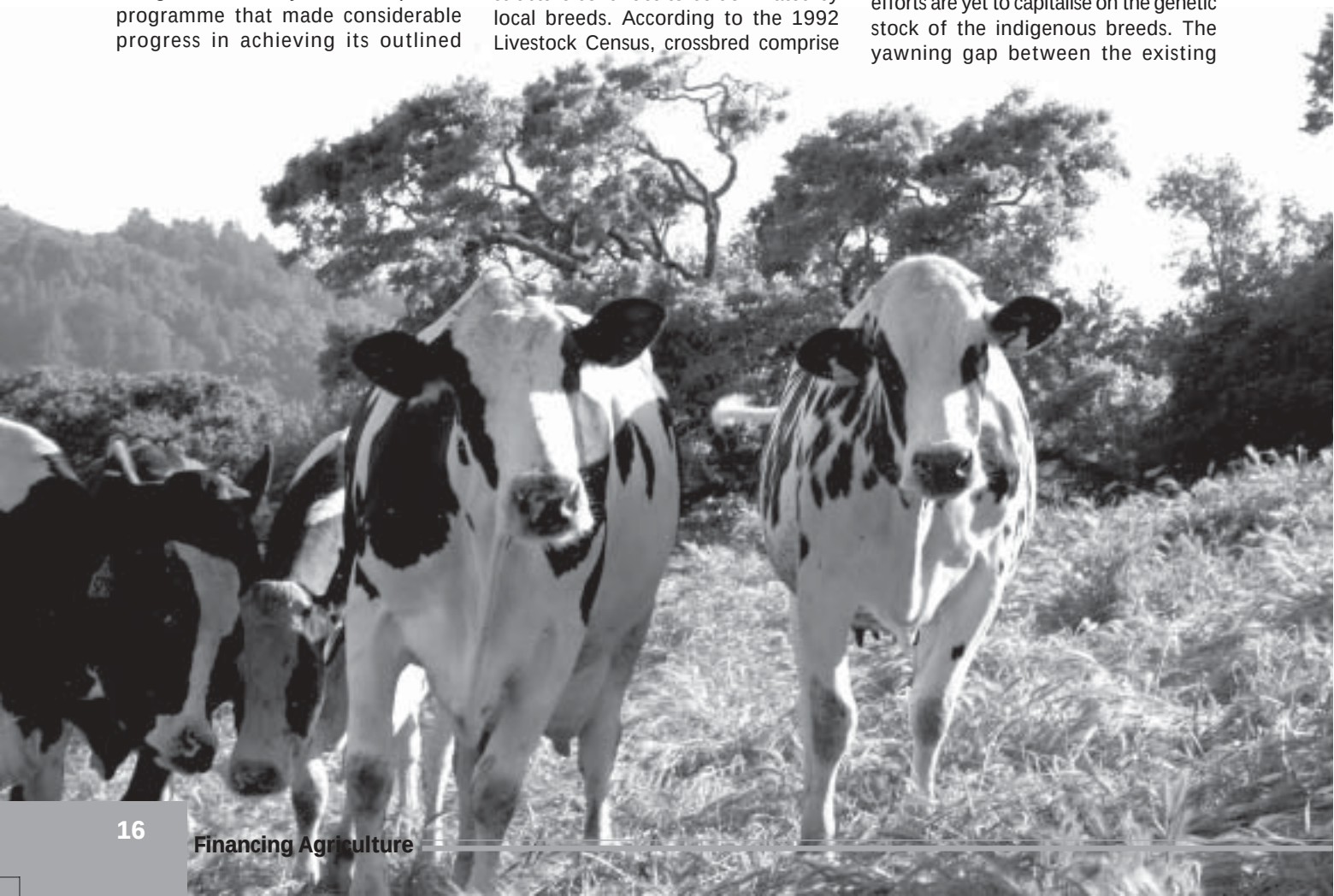


Table 1: Yield Levels and Growth in Outputs of Livestock

Items	Growth rate (%) 1981-96	Average yield (kg/animal annum) 1992-93	
		India	World
Indigenous cattle	-	572	1993*
Crossbred cattle	-	2051	-
Buffalo	-	1263	-
Egg	6.7	-	-
Desi layers	-	108	-
Improved layers	-	237	-
Beef and veal	11.9	10.3	203
Buffalo meat	6.7	138	137
Mutton and lamb	2.0	12	15
Goat meat	3.9	10	12
Pig meat	8.0	35	76
Poultry meat	9.6	-	-

*average for cattle

Table 2: Species-wise Percentage of Crossbred in Total Population, 1992

	Rural	Urban	India
Cattle	7.0	20.2	7.4
Sheep	4.7	7.0	4.8
Pig	14.2	16.4	14.5
Poultry	31.8	44.2	32.7

slaughter rates and potential of-take for certain species merits urgent attention. Premature slaughtering of animals for meat is a national waste. A case in point is that of goat and buffalo. Improvements in poultry breeds must concentrate on increasing feed efficiency and tropical adaptation. Non-compliance of photo-sanitary and quality standards in exports of livestock products is another grey area. Ineffective quarantine regime leads to importation of contaminated biological and infected livestock species.

Reforms

Till 1990, the policy thrust in this sector was rather moderate. In 1991, dairy sector was delicensed in order to attract private investment and new technologies. The policy remains restrictive in the sense that the new entrants are required to develop new milk-sheds. Restriction on processing of milk into high value products during lean season of production also acts as a disincentive for private investment.

The co-operative sector is a major player in the organised marketing of milk and its products. In 1991, dairying processing was de-licensed with the objective of promoting competition and augmenting technology. This resulted in weakening of the co-operative sector by the onslaught of new entrants. In order to contain this problem, the Milk and Milk Products Order (MMPO) was promulgated in 1992. The MMPO is an example of the policy dilemma that the government faces. The intention of promoting viable and vibrant co-operative is a national priority. However, blanket protection to the entire sector may encourage inefficiency in the guise of national interests. Therefore there is room for reforming the MMPO by rendering it more flexible.

Sector Highlights

- Animal husbandry and Dairying play an important role in national economy and in socio-economic development of the country.
- Animal husbandry outpour constitutes about 30 percent of the country's agricultural output.
- Animal Husbandry sector contributes 5.3 percent to the total GDP and about of quarter of the GDP from agriculture and allied activities.
- Livestock sector provides regular employment to 11 million in principal status and 9 million in subsidiary status.
- Women constitute 69 percent of the labour force in livestock sector as against 35 percent in crop farming.
- According to the All India Summary Reports of 17th Livestock Census (released in July 2006), India possesses the largest livestock population in the world after Brazil. It accounts for 14 percent of the cattle population and 57 percent of buffalo population.
- The 18th livestock census has been conducted throughout the country with reference date of 15 October 2007, results of which are awaited.
- India has become the largest producer of milk in the world.
- Livestock contributed 104.8 million tonnes of milk, 53.5 billion eggs, 44 million kgs of wool, 2.6 million tonnes of meat and 7.3 mullion tones of fish during 2007-08.
- Livestock Insurance Scheme was approved in February 2006 for its implementation during the remaining part of 2005-06, and in 2006-07 on a pilot basis in 100 selected districts across the country with a total outlay of Rs. 120 crore. The scheme aims at protecting the farmers against losses due to untimely death of animals. The Central Government is providing subsidy to the tune of 50 per cent of the premium under the scheme.
- About 6 million people are employed in the fisheries sector.
- Poultry development in India has made impressive progress during the last three decades. At present India ranks among the top 5 nations in egg production in the world.
- India has become the largest global producer of milk.
- India is the sixth largest producer of fish and second largest producer of inland fish in the world.

Such restrictions curb competition and market efficiency, which are essential for stimulating investment in productivity augmenting technologies both at macro and micro levels. The onset of economic reforms programme helped boost exports of livestock products. Buffalo meat export recorded substantial increase in recent years mainly because of its price competitiveness. The scope for exports of sheep, goat and poultry meat is constrained by high domestic demand and prices.

Exports

On the export front, India has a competitive advantage in the world market for many livestock products. However, its share in world trade continues to be meagre. Dairy products export has not been encouraging in the past due to high domestic demand and lack of competitiveness in the world market. With the reduction in subsidies under WTO agreement by the European countries, India's export of dairy products is likely to expand on account of price competitiveness. Member states of the WTO have to reduce export subsides and volumes of export by 36 and 21 percent respectively.

Health, nutrition and extension support merits special consideration in the process of technological transformation of livestock sector. The current extension system is largely crop oriented. Based on a SWOT analysis of the extension system for crop production, a flexible system for livestock should be evolved. This may involve many actors viz government, private processing industries and non-governmental organisations. In the area of health, smaller animals need greater attention, and so would an appropriate institutional framework.

Technological change must be accompanied by policies aimed at population optimisation and enhanced feed fodder supply. In rural areas the potential benefits of technological change are likely to be greater for medium and large farmers 'due to skewed distribution of land' which is a crucial determinant of the size of livestock holding. Strong measures in the form of institutional arrangements and policy intervention would be needed to counter these tendencies.

Priorities in Research

Reorientation of research priorities is the need of the hour. In the past, research efforts have been cattle –centered. This has yielded some results, but at the cost of other promising livestock species like the buffalo, sheep and goats. Henceforth, livestock research needs to internalise certain crucial technical parameters. Regarding cattle, a shift in direction is required. The emphasis must be on ecological adaptability and disease resistance of crossbred species. Buffalo holds the promise of raising milk production. Its feed conversion efficiency is remarkable and a breakthrough in buffalo breeding will provide a big push to the livestock economy. Small ruminant meat production is likely to come under pressure unless there is a breakthrough in the genetics of sheep and goat.

Genetic evaluation of 75-80 percent of goats is yet to be attempted. Therefore, buffalo and small ruminants deserve a greater share in research resources. Research focusing on heat stress in various agro-ecological regions warrants priority. Simultaneously, crop improvement efforts must focus on the forage quality aspects. A farming system perspective needs to be adopted across the board. Research paradigm must be client oriented. Future research agenda therefore, should have an explicit focus on these issues.

(The Writers are Academics at the Marathwada Agricultural University, Parbhani)

High Power Panel Moots Doubling of Milk Production

The High Powered Committee on Animal Husbandry and Dairying in a report submitted to the Planning Commission in January called for redoubling efforts to increase milk production. "We should also be aware that if large shortages are likely to come up in the short run, then management has to be forward looking," commented Planning Commission member Abhijit Sen who received the report.

The 10-member committee constituted by the Planning Commission was aimed to give a boost to the Animal Husbandry and Dairying sectors under the chairmanship of the President of Indian Dairy Association. The report noted that too many schemes being implemented by the Department of Animal Husbandry and Dairying (DAHD) are difficult to monitor and be replaced by a focused and well developed approach.

"There are over 24 schemes being implemented by the DAHD, which make them difficult to monitor and should be replaced," the report said. It also suggested that the major emphasis of most of these schemes were on improving the genetic make up and providing animal health facilities without regard to development of feed and fodder resources.

"In future the approach should be on improving the fodder resources along with improvement in productivity," the committee said, adding that it feels that technology transfer and extension should receive high priority in Animal husbandry and Dairying sector to ensure high growth. The committee also suggested that central sector and centrally sponsored scheme in future should be taken up in three distinct streams. The first stream should comprise of five schemes of national importance like cattle and buffalo breeding or development project, national livestock extension programme and national project on control of animal diseases.

The second stream could comprise of schemes of regional importance on species specific or state specific projects like development of Dairy Sector, Sheep and Goats.

India's Fertiliser Policy and Scope for Reforms

By **Satish Chander ***

Fertiliser is the vital input needed for increasing agricultural production. It has been the endeavour of the government to ensure availability of adequate quantity of fertiliser at reasonable prices to the farmers across the country over the years. Various committees were formed to suggest measures for promoting higher and balanced use of fertilisers to ensure quality fertiliser and encourage indigenous production. During the early phase of development in the fertiliser sector, the emphasis was more on promotion and popularisation of fertiliser, encouraging indigenous production and equitable distribution.

However, during the later stage, due to intensification of agriculture resulting in multi-nutrient deficiencies, the focus of the government shifted more towards balanced fertilisation, besides addressing the issues relating to pricing and subsidy arising out of rising subsidy bill. Nutrient based subsidy (NBS) was introduced by the Govt. of India from 1April, 2010. NBS is expected to promote balanced fertilisation through higher use of secondary and micro nutrients along with primary nutrients. Under NBS, farmers will have access to new efficient products.

Essential Commodity

Fertiliser is the essential input needed for increasing agricultural production. Keeping in view the importance of this vital input, Government of India declared fertiliser as an essential commodity and notified the Fertiliser Control Order (FCO) in 1957. FCO was notified to regulate the sale, price, and the quality of fertilisers. Over the years, it has been the endeavour of the government to ensure availability of adequate quantity of fertiliser at reasonable prices to the farmers across the country over the years.

Various committees were formed from time to time to suggest measures for promoting the increasing and balanced use of fertiliser, encourage indigenous production, ensure quality products and enable equitable distribution of fertiliser to the farmers across the country. During the early phase of development in the fertiliser sector, the emphasis was laid more on promotion and popularisation of fertiliser, stepping up its indigenous production and equitable distribution. During the later stage, due to intensification of agriculture resulting in multi nutrient deficiencies, the focus of the government shifted more towards balanced fertilisation besides addressing the issues relating to pricing and subsidy arising out of rising subsidy bill. The article looks at the important developments of fertiliser policy in India and suggests measures for comprehensive reform of the fertiliser sector in future.

Policies

Among the various committees formed in the past, the recommendations of the *Committee on Fertilisers* (Sivaraman Committee: 1965-66) laid the foundation regarding indigenous production, promotion, distribution, and consumption of fertilisers in the country. **Table 1** shows the sizeable growth in production and consumption of fertiliser nutrients between 1951-52 and 1971-72.

Regulation of Distribution

In the early 1970s, shortages of fertilisers were experienced in the country. Consequently, the government started regulating the distribution of fertilisers under the Essential Commodities Act (ECA) and the concept of Half-yearly Zonal Conferences was introduced in 1972. All the fertilisers were distributed by the manufacturers according to their ECA allocation during the two cropping (Kharif and Rabi) seasons, as per the supply plan fixed at the Zonal conferences. Fertiliser shortages in the early 70's led the government to pass the Fertiliser Movement Control Order in 1973, which brought fertiliser distribution and its inter-state movement under government control.

Retention Pricing Scheme

In the wake of oil crisis in mid 70s, prices of fertilisers and raw materials increased astronomically high in the international market. As a result, retail prices of fertilisers increased significantly. This led to reduction in fertiliser consumption and imbalance in NPK use ratio. As an immediate measure, Government started giving a subsidy of Rs.1250 per tonne of P_2O_5 on phosphatic fertilisers effective from March 1976. Meanwhile, to resolve the dilemma of how to keep farm gate prices of fertilisers at an affordable level in the face of rising production / import costs, the Government of India introduced Retention Pricing Scheme (RPS) based on the recommendations of "Fertilizer Prices Committee," headed Shri S. S. Marathe. RPS was introduced for urea in November 1977, complex fertilisers in February 1979 and for SSP in 1982.

Impact

The introduction of RPS led to a spectacular increase in fertiliser consumption as well as domestic production of fertilisers. Consumption of fertiliser nutrients (N+P+K) increased close to 3 times from 4.29 million tonnes in 1977-78 to 12.73 million tonnes in 1991-92. Likewise indigenous production of fertilisers (N+P) increased 3.7 times from a level of 2.67 million tonnes to 9.86 million tonnes during the same period **(Table 2)**.

Joint Committee on Fertiliser Pricing (JPC)

During RPS regime, there was phenomenal increase in fertiliser consumption and domestic production. But increase in the cost of production and imports without suitable adjustment in MRP led to significant increase in subsidy bill. Central subsidy on fertilisers increased from Rs.266 crore in 1977-78 to Rs. 4800 crore in 1991-92. Concerned with the increasing subsidy burden, caused by rising cost of import and domestic production, a joint parliamentary committee was set up by the Government in the name of *Joint Committee on Fertiliser Pricing* (JPC) under the Chairmanship of Shri Pratap Rao B. Bhosale, M.P in December 1991.

The recommendations of the committee led to a series of changes in fertiliser policy as stated below:

(i) The prices, movement and distribution of all phosphatic and potassic fertilisers were decontrolled w.e.f. 25th August'1992.

(ii) Retail price of Urea reduced by 10 per cent w.e.f. 25th August'92.

(iii) Import of rock phosphate and sulphur was decanalised w.e.f 1st March'92.

(iv) Import of ammonia and phosphoric acid was decanalised w.e.f 1st April'92.

(v) Import of DAP was decanalised w. e. f 17th September'92.

(vi) Import of MOP was decanalised w. e. f 17th June,'93

Decontrol of P & K Fertilisers

Decontrol of phosphatic and potassic fertilisers led to reduction in the consumption of these fertilisers and NPK use ratio was seriously disturbed. NPK use ratio widened from 5.9: 2.4:1 during 1991-92 to 9.5:3.2:1 during 1992-93 and 9.7:2.9:1 during 1993-94 **(Table 3).**

Government of India introduced concession scheme to mitigate the rising cost of production and imports. Nevertheless, it took several years to restore the NPK use ratio to the level of 1991-92.

Committees

The Government appointed various other committees during the decade of 2000 to suggest alternatives to the RPS. These include *Fertilisers Pricing Policy Review Committee, headed by Dr. C. H. Hanumantha Rao in March 1998 and Expenditure Reforms Commission (ERC) in the year 2000*. The ERC recommended replacement of unit specific RPS by group based concession scheme. The recommendations of the ERC were further modified based on which the *New Pricing Scheme (NPS) was brought in effect from 1.4.2003* wherein Unit Specific Subsidy in the latter has been replaced by a Group Based Concession in the former. NPS is still continuing on urea.

Table 1: Progress in Domestic Production and Consumption

Year	Production (Million tonnes)			Consumption (Million tonnes)			
	N	P	Total	N	P	K	Total
1951-52	0.029	0.010	0.039	0.059	0.007	-	0.066
1961-62	0.154	0.065	0.220	0.250	0.060	0.028	0.338
1965-66	0.238	0.119	0.357	0.575	0.133	0.077	0.785
1971-72	0.949	0.290	1.239	1.798	0.558	0.301	2.657

Table 2: Progress in Domestic Production and Consumption

Year	Production (Million tonnes)			Consumption (Million tonnes)			
	N	P	Total	N	P	K	Total
1977-78	2.00	0 .67	2.67	2.91	0.87	0.51	4.29
1981-82	3.14	0.95	4.09	4.07	1.32	0.68	6.07
1985-86	4.32	1.43	5.75	5.66	2.01	0.81	8.47
1991-92	7.30	2.56	9.86	8.05	3.32	1.36	12.73

Steps were also taken by the government to undertake studies to reduce costs and concessions on phosphatic fertilisers. Notable among these were *Cost Price Study of Complex Fertilisers by Tariff Commission* in May 2001 and that of DAP and MOP in February 2003, *Cost Price Study of Single Superphosphate* by Cost Account Branch (CAB) under Department of Expenditure in April 2004, *Expert Group on Phosphatic Fertilizer Policy* headed by Prof. Abhijit Sen in the year 2005.

Rising Subsidy

Most of the committees made recommendations relating to pricing and subsidy. Nevertheless, amount of subsidy kept on increasing as a result of rising cost of inputs for domestic production besides increase in cost of imports without commensurate increase in retail prices of fertilisers. Fertiliser industry remained highly controlled whereas reforms took place in other sectors. Cost of inputs was decontrolled resulting in abnormal increase in the prices. 'Cost plus approach' with stringent regulations and procedures did not encourage any investment in the sector. The health of the fertiliser industry was adversely affected and no new investment took place in the decade of 2000. The constraint in the availability of feed stock also added to the misery. **Table 4** shows the stagnation in domestic capacity and production during the current decade.

Against the backdrop of stagnation in indigenous capacity and production of fertilisers, the country experienced surge in demand for fertilisers in the recent years. Successive good monsoon and attractive procurement prices of crops for all major crops, led to surge in demand for fertilisers. The growth in fertiliser consumption was 10-11 percent per annum during 2004-05, 2005-06 and 2008-09.

In order to meet increasing demand, the Government resorted to high imports despite steep increase in international prices. In Urea, while India achieved self-sufficiency during 2000-01, the import went up to 6.9 million tonnes in 2007-08 and 5.7 million tonnes in 2008-09. Similarly, imports of DAP/ MAP touched 6.5 million tonnes and MOP 5.7 million tonnes during 2008-09. The cost of raw materials and intermediates for manufacture of phosphatic fertilisers increased manifold. The country paid heavy price on import of fertilisers particularly when there has been abnormal increase in the prices of fertilisers and fertiliser raw-material and intermediates during this period. **Table 5** shows increasing dependence on imports in the recent years.

High cost of imported fertilisers, feedstock, raw materials/ intermediates led to substantial increase in subsidy bill. While cost of inputs increased substantially, MRPs of fertilisers remained unchanged since February 2002. In case of NP/NPK fertilisers, the MRP rather reduced w.e.f 18th June, 2008. The total amount of fertiliser subsidy which used to be about Rs. 11847 crore in 2003-04 increased to Rs. 96,603 crore in 2008-09. Fertiliser

Table 3: Impact of decontrol on P & K fertilisers

Year	Consumption (Million tonnes)				NPK use ratio
	N	P	K	Total	
1991-92	8.05	3.32	1.36	12.73	5.9:2.4:1
1992-93	8.43	2.84	0.88	12.15	9.5:3.2:1
1993-94	8.79	2.67	0.91	12.37	9.7:2.9:1
1994-95	9.51	2.93	1.12	13.56	8.5:2.6:1
1995-96	9.82	2.90	1.16	13.88	8.5:2.5:1
1996-97	10.30	2.98	1.03	14.31	10.0:2.9:1
1997-98	10.90	3.91	1.37	16.19	7.9:2.9:1
1998-99	11.35	4.11	1.33	16.80	8.5:3.1:1
1999-2000	11.59	4.80	1.68	18.07	6.9:2.9:1

Table 4: Capacity and production of fertilizer nutrients(Million tonnes)

Year	Capacity			Production		
	N	P_2O_5	Total	N	P_2O_5	Total
2000-01	11.987	4.988	16.975	10.943	3.734	14.677
2001-02	12.166	5.112	17.278	10.690	3.835	14.525
2002-03	12.238	5.333	17.571	10.508	3.908	14.416
2003-04	12.166	5.402	17.568	10.557	3.627	14.184
2004-05	12.208	5.480	17.688	11.305	4.038	15.343
2005-06	12.288	5.460	17,748	11.333	4.203	15.536
2006-07	12.290	5.736	18.026	11.525	4.440	15.965
2007-08	12.290	5.875	18.165	10.903	3.714	14.617
2008-09	12.290	5.892	18.182	10.900	3.417	14.317

Table 5: Import of fertilisers(Million tonnes)

Year	Urea	DAP	MAP	MOP
2000-01	-	0.861	0.078	2.646
2001-02	0.220	0.933	0.125	2.810
2002-03	0.119	0.383	0.100	2.603
2003-04	0.143	0.734	0.065	2.579
2004-05	0.641	0.644	0.022	3.410
2005-06	2.057	2.438	0.045	4.578
2006-07	4.719	2.875	0.097	3.448
2007-08	6.928	2.724	0.266	4.421
2008-09	5.667	6.192	0.267	5.672

industry continued to suffer on account of various factors, such as, inadequate provision in the budget, delay in payment of subsidy, part of the subsidy paid in bonds during 2007-08 and 2008-09. The amount of subsidy in 2009-10 was Rs.52980 crore.

Apart from fiscal concerns, declining response on fertiliser use particularly on foodgrains has been noticed in the decade of 2000. The average response to fertiliser application used to be around 10:1 during 1960s and 1970s. The response ratio obtained by research scientists which had been adopted by Department of Agriculture and Cooperation, GOI, for calculating demand projections was 1:7.5 for the 8th Plan, 1:7 for 9th Plan, 1:6.5 for 10th Plan and 1:6 for 11th Plan. However, IARSI, ICAR has made a study in the recent years to work out the response ratio of fertilisers for foodgrains based on the farmers field data and has concluded the response ratio of NPK as 1:7.8, but the response ratio varied for different crops from 1:4.9 for oilseeds to 1:7.1 for pulses and 1:8.6 for cereals.

Skewed Usage

The fertiliser use is also skewed in the country. While per hectare use of fertiliser nutrient is 240 kg in Andhra Pradesh and 221 kg in Punjab, it is only 2 kg in Nagaland and 2 kg in Arunachal Pradesh. About 85 percent of the total consumption of fertiliser nutrients is consumed by 268 districts (about two third) only.

The imbalanced use of chemical fertilisers and neglect of organic manure caused many problems, like stagnation in productivity, soil sickness, widespread deficiency of secondary and micro nutrients, spread in salinity and alkalinity, etc. On an All-India basis, the deficiency of Sulphur has been found to be 41 percent, Zinc 48 percent, Boron 33 percent, Iron 12 percent and Manganese 5 percent.

Subsidy for imported and indigenous DAP was made uniform based on IPP concept. In case of NP/ NPK Complex Fertilisers, the price of P_2O_5 was determined on the basis of imported DAP and imported Ammonia

Soil Testing

Fertiliser applications are mostly not based on soil-test values. There are about 650 soil testing laboratories in the country with an analysing capacity of 6.86 million samples per annum. These facilities are far from adequate compared to large cultivated area and number of farm holdings.

FCO contains a long list of fertilisers of more than 80 products. However a few products are marketed on which subsidies are allowed. These include Urea, DAP, SSP, MOP and 13 grades of complex fertilisers. Out of these, bulk of the share is comprised of Urea, DAP and MOP. Urea accounts for 91 percent share of N consumption and the share of DAP in total P is about 61 percent. As mentioned earlier, increasing use of high analysis fertilisers has resulted in multi-nutrient deficiencies in the soil.

Recent Initiatives

Stagnation in indigenous capacity due to no investment in fertiliser sector in the current decade, surge in demand for fertilisers, increasing imports at exorbitant prices to meet the demand-supply gap and the consequent increase in subsidy have been the concerns in the recent past. Concerns are also there on diminishing response to fertiliser use due to deteriorating soil health, arising out of multi-nutrient deficiency in the soil. All these concerns compelled the Government to bring necessary changes in the policy.

During 2007-08 and 2008-09, GOI had taken a series of policy measures which aim at encouraging the growth of the fertiliser industry besides promoting balanced nutrition of the soil and inducement of new fertilisers.

Policy on Phosphatic, Potassic Fertilisers

In the policy for Phosphatic and Potassic fertilisers a departure was made from cost plus approach. The subsidy was benchmarked to Import Parity Price (IPP) of DAP. Subsidy for imported and indigenous DAP was made uniform based on IPP concept. In case of NP/ NPK Complex Fertilisers, the price of P_2O_5 was determined on the basis of imported DAP and imported Ammonia. The price of 'K' was determined on the basis of imported

MOP. The price of 'N' continued to be determined on unit wise basis. Cost of 'S' in sulphur containing complex fertilisers was to be recognised based on the price of imported sulphur.

With regard to SSP, the new policy made provision for fixation of uniform MRP throughout the country by the Central Government unlike the earlier practice of MRP being fixed by the State Governments. The policy also provided for monthly revision in the concession rates to reflect the variation in prices of raw-materials vis-à-vis indigenous and imported rock phosphate and imported Sulphur. The policy recognised Sulphur content in SSP while fixing MRP. The policy continued from 1st May 2008 to 30th September, 2009. With effect from 1st October, 2009, the policy once again changed. The government had set a fixed concession of Rs. 2000 per tonne of SSP with open MRP w.e.f 1st October, 2010.

Imported MAP (11-52-0), and MAP granulated out of imported powdered MAP was brought under concession scheme w.e.f 1.4.2007. TSP was brought under the concession scheme w.e.f 1.4.2008.

Nitrogenous Fertilisers

The Govt. of India notified Policy for New investments in urea sector and long term offtake of urea from joint ventures abroad' w.e.f 4th September, 2008. Although for the existing production and imports, urea is under price control and 50 percent movement control and subsidy is administered by NPS III, Urea Investment Policy has been in put in place to attract investment into this sector.

In this policy, a departure has been made from cost based approach and benchmarking has been made to imports.

Some salient features of the policy are as under:-

1. The additional urea from (i) Revamp of existing units (within four years of Notification) will be recognised at 85 percent of Import Parity Price (IPP), (ii) Expansion of existing units (within five years of Notification) at 90 percent of IPP, (iii) Revived units of HFC and FCI (within five years of Notification) at 95 percent of IPP, with the floor and ceiling prices of US$250 per tonne and US$ 425 per tonne, respectively in each category.
2. The price of urea from the Greenfield projects will be derived through a bidding route with a minimum floor price and an appropriate ceiling price which will be decided at the time of bidding based on the domestic gas prices and the IPP. The bidder will have to indicate the price as a percentage discount below the prevailing IPP for urea.
3. The coal gasification based urea projects will be treated at par with brown field or Greenfield project as the case may be. In addition, these projects will also get incentives or tax benefits.
4. The joint venture projects abroad in gas rich countries will be encouraged through firm off take contracts with pricing decided on the basis of prevailing market conditions and in mutual consultation with the joint venture partners. The principle for deciding upon the maximum price will be the price achieved under the green field projects or 95 percent of IPP subject to a floor of US$225/ tonne CIF India and a cap of US$405/ tonne CIF India inclusive of handling and bagging cost.

With a view make available adequate quantity of sulphur-carrying fertilisers, indigenous Ammonium Sulphate (20.6-0-0-23) of GSFC, Baroda and FACT-Udyogamandal has been brought under the concession scheme.

Freight Reimbursement Policy

Prior to 1st April, 2008, there were different freight policies for different fertilisers. In the case of urea, the freight cost was being reimbursed separately and had the provision for escalation and de-escalation. In case of other fertilisers, like DAP and NP/ NPK complex fertilisers, the freight cost was part of the price subsidy and had no provision for escalation/de-escalation. Under the new uniform freight policy inland freight for transportation of fertilisers are to be reimbursed to the fertiliser companies from plant/port upto the block level. For this, rates would be calculated based on actual railway freights and in case of road transport, it will be based on the average lead distance of all the blocks in the

All subsidised fertilisers can be used for manufacturing of customised fertilisers. The company shall fix reasonable MRP for its approved grades of customised fertilisers

district and the State level truck rates from rake point to the block. The state governments will be responsible for confirming the receipts of fertilisers as indicated in the movement plan in FMS.

Balanced Fertilisation

Keeping in view the objective of balanced fertilisation, the Government has introduced a couple of new policies between 2007-08 and 2008-09. These includes guidelines for production of customised fertilisers, introduction of nutrient-based pricing scheme and policy for fortified/ coated fertilisers, as indicated below.

Customised Fertilisers

Keeping in view the focus of balanced fertilisation, Government of India (GOI) formulated guidelines for production and use of customised fertilisers under Clause 20B of FCO, 1985. The guidelines were issued on 11 March, 2008 to enable interested companies to initiate the process of developing different grades of customised fertilisers. The guidelines broadly covered the definition, eligibility criteria, grades, quality requirement, and tolerance limit, labelling and pricing of customised fertilisers.

As per the guidelines, permission for manufacture and sale of customized fertilisers shall be granted to the manufacturing companies whose annual turnover is Rs.500 crores or above, having soil testing facility with annual capacity of 10,000 samples per annum and should have analysing capacity for NPK, micronutrient and secondary nutrient. The proposed grades shall be based on area specific and crop specific soil testing results. All subsidised fertilisers can be used for manufacturing of customised fertilisers. The company shall fix reasonable MRP for its approved grades of customised fertilisers.

Fortified and Coated Fertilisers

To promote the use of secondary and micro nutrients and to improve fertilizer use efficiency, the Government of India has allowed the fortification/coating of fertilisers specified in Fertiliser Control Order (FCO), up to 20 percent of their total production w.e.f 1st June 2008. The manufacturers have also been allowed to charge additional cost involved in manufacture of these fertilisers from the consumers as per the Government guidelines. The manufacturers / producers of fertilisers are allowed to sell the FCO approved fortified/ coated subsidized fertilisers, except for Zincated urea and Boronated SSP at a price upto 5 percent above the MRP. For Zincated urea and Boronated SSP, the manufacturers are allowed to charge upto 10 percent above MRP of urea and SSP, respectively.

Nutrient based pricing of subsidised fertilisers

The GOI introduced nutrient based pricing of subsidised fertilisers to promote balanced fertilisation. As per the scheme, the per unit price of nutrients N, P, K and S will be the same in all complex grade fertilisers. Consequently, MRPs of complex fertilisers have been significantly reduced w.e.f. 18th June 2008. The nutrient prices of Urea, DAP and MOP are the benchmark for determining the prices for nutrient prices of N, P and K. For the first time, Sulphur has been recognised as a primary nutrient to be covered under the Concession Scheme.

2010-11 – 1st Stage of Reform in the Fertiliser Sector

Nutrient based subsidy

Government of India introduced Nutrient Based Subsidy on phosphatic and potassic fertilisers w.e.f. 1st April, 2010. NBS is applicable on DAP, MOP, MAP, TSP and 12 grades of complex fertilisers. Subsidy under NBS is the same both for domestic and imported fertiliser products. NBS for SSP introduced w.e.f. 1st May, 2010. Primary nutrients, namely N, P and K and secondary nutrient, namely Sulphur (S) contained in the fertilisers are eligible for subsidy. The per kg NBS for nutrients N, P, K and S for 2010-11 are as follows:

Nutrient	NBS (Rs. per kg of nutrient)
N	23.227
P	26.276
K	24.487
S	1.784

Additional subsidy on subsidised fertilisers fortified with Boron is Rs. 300 per tonne and zinc Rs.500 per tonne. Manufacturers of customised fertilisers and mixture fertilisers are eligible to source subsidised fertilisers as raw material for their products. Subsidy will be released through the industry. MRP of urea has been raised by 10 percent from Rs.4830 per tonne to Rs.5310 per tonne w.e.f 1.4.2010. MRPs of P & K subsidised fertilisers will be determined based on the demand-supply balance and fixed by the marketers. Marketers will be required to print retail price along with applicable subsidy on the fertiliser bags.

Assessment of NBS

Initial reports after the introduction of NBS are showing positive results due to certainity in the policy environment. Some of the positive results of NBS are listed below.

(i) Stability in the international prices of fertilisers.

(ii) Industry has been able to tie up the supply of raw materials for complex/ phosphatic fertilisers which are mostly imported. This will lead to higher production of these fertilisers.

(iii) Arrangements for major quantum of imports of finished fertilisers have been finalised at the beginning of the year.

(iv) NBS has not led to any significant increase in retail price to the farmers. A marginal increase in MRP on some products noticed on expected lines. In fact, there has been decline in the MRP of SSP due to provision of higher subsidy per tonne than provided under the old dispensation.

(v) Arrangement of purchase of inputs and finished products at reasonable prices for the full year from the international market is expected to keep subsidy bill within manageable limits.

Suggested Reforms

While in the first phase, P and K fertilisers have been brought under the NBS, there is need for further reform in the fertiliser sector. The following measures are needed to be taken for comprehensive reform in the fertiliser sector.

Urea needed to be brought under NBS

Urea, which constitutes more than half of the total fertiliser products consumed in the country, needs to be brought

within NBS gradually. This will lead to a fair balance in the market prices of various fertilisers. There is also need for decanalisation of import of urea on the lines of P & K fertilisers which were decanalised way back in 1992.

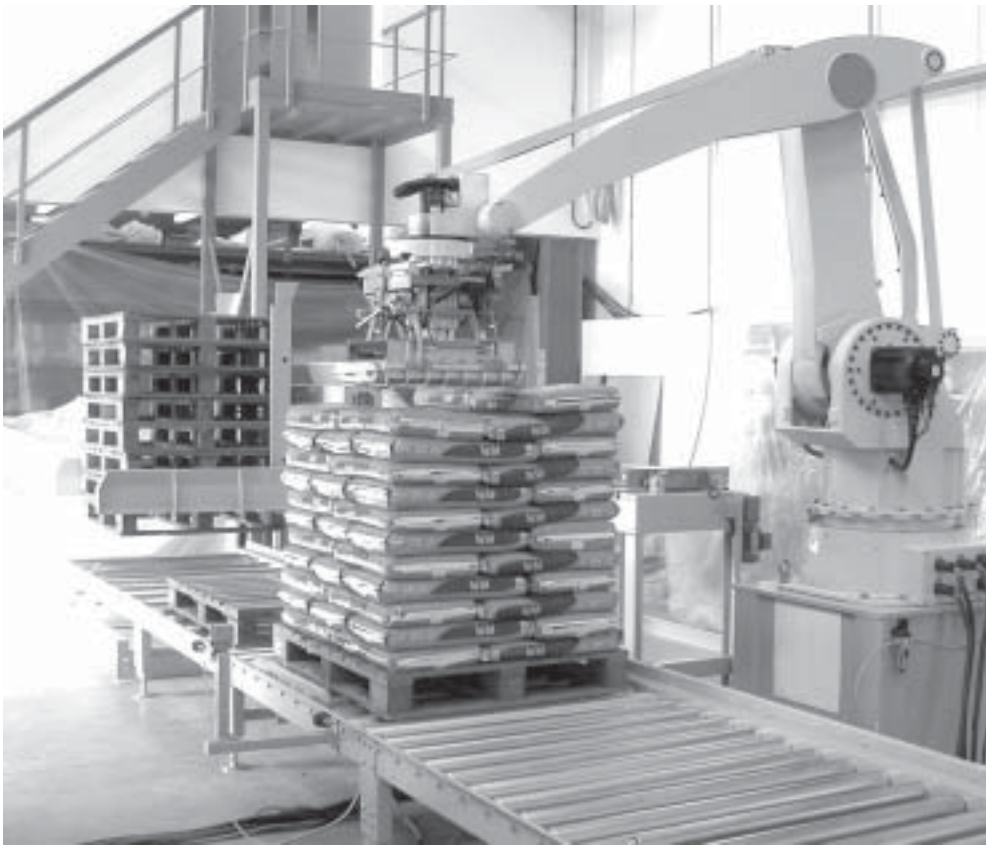
Need for allocation of gas for future brown field/ green field plants

The issue of feed stock is extremely critical particularly for brown field / green field plants. There should be firm off take agreement of gas committing reasonable price for at least 15 years from production. The price of gas will alone determine the competitiveness of Indian Fertiliser Industry in the international market.

(i) Need for extension of subsidy: In addition to the above steps, the amount of subsidy should be extended to a larger number of products. More than 80 fertiliser products are included in FCO but subsidy is provided on a few generic products, such as Urea, DAP, MOP. Balanced fertilisation process will become a reality only after the basket of fertilisers eligible for subsidy/ concession is widened to include other new products such as customised fertilisers, water soluble fertilisers, etc.

(ii) Encouragement of production and use of SSP: Single super phosphate contains 16 percent phosphorous, 11 percent sulphur and about 21 percent calcium. It is useful for various crops besides oilseeds and pulses, in particular. Currently, there are about 80 SSP plants with a total capacity over 7 million tonnes. But capacity utilisation is only 40 percent. There is enormous scope for improvements in production of SSP which will reduce the dependence on imported DAP.

(iii) Efficient use of fertiliser : Efficient use of fertiliser needs four Rs, i.e, Right product, Right time, Right dose, Right method. There is need for proper mapping of soil fertility at the micro level using GPS. Residual effect of phosphorous, sulphur has to be harnessed through change in cropping system. Use of customized fertilisers will improve balanced use of fertiliser, Fertigation will improve efficiency in water and fertiliser use.



(iv) Need for Improvement in Extension Facilities: According to the Survey conducted by National Sample Survey Organisation under the Ministry of Statistics and Programme Implementation, Govt. of India conducted in 2005, out of a list of 16 sources of information provided to the farmers accessing modern agricultural technology, only 5.7 percent farm households accessed the technology through extension worker. Nearly 16.7 percent farmers accessed it through other progressive farmers and 13.1 percent had it through other input dealer and 13 percent through radio. Extension system at the village level has to be improved considerably. Yield gap has to be bridged by actual demonstration of best farmer's plot in a village. There are more than 600 *Krishi Vigyan Kendras* (KVKs) spread out in the districts. KVKs may be geared up for dissemination of knowledge and training to the farmers.

Conclusion

To conclude, it may be construed that NBS is expected to promote balanced fertilisation through higher use of secondary and micro nutrients along with primary nutrients. Farmers will have access to new efficient products. NBS is expected to project actual demand of fertiliser nutrients in the country and facilitate their imports within manageable limits. It will induce investments both in India and overseas. Reforms will address fiscal management of subsidy bill. Global trade to India will be more holistic including macro and micro nutrients. In due course, NBS is intended to move to a system of direct transfer of subsidy to the farmers. Fertiliser industry will continue to cooperate with the government for taking the reform process further to fulfill the objective of sustaining higher agricultural productivity and enhance net farm income.

** Writer is the Director General of Fertiliser Association of India, New Delhi*

India Mulls Agri Cooperation with US, Argentina

Agriculture Minister Sharad Pawar Visits Argentina

As part of US Government's partnership with India on agricultural cooperation and food security, the first meeting of the U.S.-India Agriculture Dialogue steering committee took place in New Delhi on 14 September 2010.

Under Secretary of State for Economic, Energy, and Business Affairs Robert D. Hormats, U.S. Department of Agriculture Under Secretary for Farm and Foreign Agricultural Services Jim Miller, and Deputy Coordinator for Development, Office of the Coordinator of Global Hunger and Food Security and U.S Department of State Ambassador William Garvelink held talks with a delegation led by Foreign Secretary Nirupama Rao.

The committee, comprised of officials from relevant U.S. government and Indian agencies and ministries, met to identify areas of cooperation for working groups on strategic cooperation in agriculture and food security; food processing, farm-to-market linkages and agricultural extension; and crop and weather forecasting.

India-US Agricultural Cooperation dates back to the early days of Indo-U.S. relations and the first green revolution.

Argentina

Meanwhile, India and Argentina signed a Memorandum of Understanding (MoU) on Cooperation in Agriculture and Allied Sectors during the recent visit of Union Agriculture Minister Sharad Pawar to that country. The MoU was signed by Pawar and Argentine Agriculture Minister Julian Andres Dominguez at Buenos Aires.

The pact provides a framework for exchange of information on best practices and technologies, cooperation in research and development and promotion of trade, investment and joint ventures. Pawar visited Argentina in the first week of September, in response to the invitation extended by Dominguez, who came to India in August.

Argentina is the largest source of import of soya oil by India and largest exporter of soya and sunflower oils in the world. In the first seven months of 2010, India has imported soya oil worth US$1.4 billion. India is also importing Argentina sunflower oil and other agro-products. During the meetings with Pawar, some Argentine companies had shown interest in growing pulses for exports to India in the future. There are 14 Indian companies which have invested about US$1 Billion in IT, agrochemicals, steel, pharmaceuticals and cosmetics in Argentina. United Phosphorus and Punjab Chemicals & Crop Protection Ltd have invested US$100 million in Argentina in the production and export of agrochemicals and seeds.

Agricultural machinery is emerging as a new area of trade and collaboration. Indian Farmers Fertiliser Cooperative Limited (IFFCO) is exploring the possibility of setting up a fertiliser plant in Argentina using natural gas as the raw material.

A number of Indian companies have shown interest in investment and joint ventures in agribusiness in Argentina, which has one of the most advanced and competitive agriculture sectors in the world.

Pawar was accompanied by Punjab Deputy Chief Minister Sukhbir Singh Badal, Minister for Energy and Water Resources Ajit Pawar, and Minister for Rural Development in Maharashtra Government Jayant Patil, and Minister of State for Agriculture in Haryana Sukhbir Singh Kataria.

Commercial dal mill in operation (Maiyya Agro Industries, Khamgaon)

Pulse Processing Industries as Opportunity in Rural Entrepreneurship and Employment

By **Suchita V. Gupta* and Dr P.B.Kale***

Pulses and legumes play an important role in the food. Grain legumes such as chickpea (*Cicer arientinum*), pigeon pea (*Cajanus cajan*), green gram (*Phaseolus aureous*), black gram (*Phaseolus mungo*) and lentil (*Lens escualanta*) are commonly referred as pulses. Pulses are rich in proteins and hence are more important in day to day diet.

Agro-processing is now regarded as the sunrise sector of the Indian economy in view of its large potential for growth and likely socio-economic impact on employment and income generation. Properly developed agro-processing sector can make India a major player at the global level for marketing and supply of processing food, feed and a wide range of other plant and animal products (Vitonde A. K. and Gedam V. M. 2002).

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Largest Producer

India is the largest pulse producer and

Particulars	Maharashtra		Vidarbha	
	Area (ha)	Production (million tons)	Area (ha)	Production (million tons)
Pigeon pea	1074000	658200	523300	344300
Bengal gram	829900	466200	216000	95700
Total pulses	3385400	1668200	1247300	603600

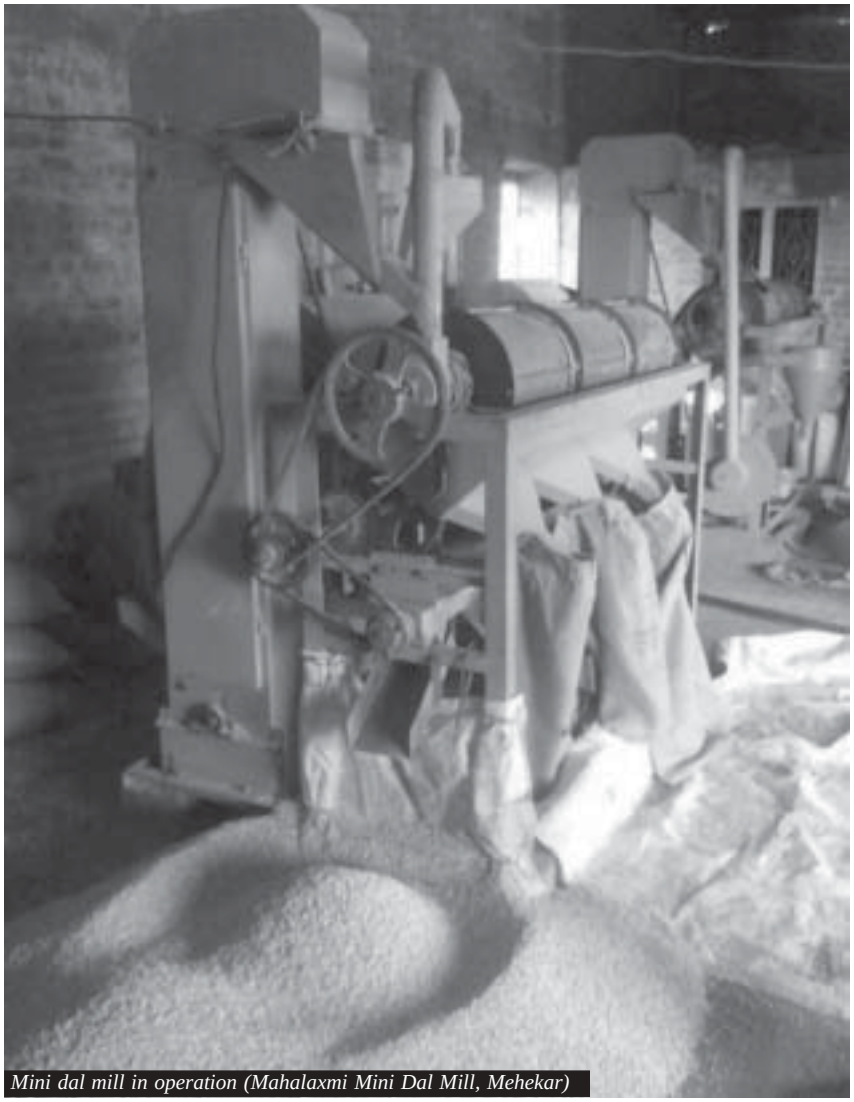
consumer in the world. Among the different pulse producing countries, India ranks first by contributing 24-26 percent of the global pulse production and 36-38 percent area of the global area. The annual pulse production of India is 14.4 million tons throughout 23 million ha area (Anon., Handbook of Agriculture, 2006). It is an essential adjunct to predominantly cereal based meal and fulfils the protein requirement of the body of majority of Indian population. In India, split of pulses are called '*dal'* or '*dhal'* and are used as a food material. Commonly it is prepared at *dal* mills (processing units).

The production of pulses in Vidarbha region of Maharashtra state is increasing day by day. The following table shows area and production in Maharashtra and Vidarbha region for area 2007-08 (Anon., Krishisanvadini, 2009).

The following pulse processing units were selected for the study.

Sr. No.	Name of processing unit	Types of organization
1.	Tulsi Agro Industries, Khamgaon	Commercial dal mill
2.	Maiyya Agro Industries, Khamgaon	Commercial dal mill
3.	Devki Agro Industries, Khamgaon	Commercial dal mill
4.	Shakambhari Dal Mill, Khamgaon	Commercial dal mill
5.	Akash Industries, Nandura	Commercial dal mill
6.	Suman Mini Dal Mill, Buldana	Mini dal mill
7.	Shree Sainath Dal Mill, Jalgaon Jamod	Mini dal mill
8.	Mahalaxmi Dal Mill, Mehekar	Mini dal mill
9.	Bhusari Mini Dal Mill, Chikhali	Mini dal mill

India is the largest pulse producer and consumer in the world. Among the different pulse producing countries, India ranks first by contributing 24-26 per cent of the global pulse production and 36-38 per cent area of the global area



Mini dal mill in operation (Mahalaxmi Mini Dal Mill, Mehekar)

Pulse processing industry is the largest food processing industry in the country. The productivity of pulses in Vidarbha region is 0.48 million tonness/hactrae. In India, 80 percent of pulses are consumed in the form of '*dal'* and '*besan'* and remaining 20 percent as whole seeds.

Buldana district of Vidarbha region is important according to pulse processing point of view. The tehsils/ talukas of Buldana district are Buldana, Jalgaon Jamod, Sangrampur, Shegaon, Malkapur, Nandura, Motala, Khamgaon, Chikhali, Mehekar, Deulgaon Raja, Sindkhed Raja and Lonar .

In the year 2007-08, the annual pulse production in Buldana district was 1,08,400 million tonnes across 2,55,200 hactare area. Hence, pulse processing industry is one of the major agro-processing industries in Buldana district. As the production is increasing, it is necessary to work out the potential of pulse processing industries in Vidarbha region. Keeping this in view, the study was undertaken to find out the present status and techno economic feasibility of pulse processing industry in Buldana district of Vidarbha region for accelerating the growth of agro processing industries. This article will study the potential of pulse milling industry in Buldana district as a case study and look at the techno-economic feasibility of pulse milling industry in general.

Table 1: Talukawise Area and Production of Pulses

Tehsil	Pigeon pea		Green gram		Black gram		Chick pea	
	Area, ha/yr	Production, tons/yr	Area, ha/yr	Production, tons/yr	Area, ha/yr	Production, tons/yr	Area, ha/yr	Production, tons/yr
Buldana	528.5	3991	108.9	930	85.4	1152	780.2	312.1
Chikhali	465.4	8286	99.3	2100	93.8	2170	750.2	306.3
Deulgaon Raja	523.7	2635	98.1	2510	70.3	1360	588.9	235.6
Sindkhed Raja	497.7	3250	72.3	3922	87.1	3025	593.1	227.2
Lonar	530.1	3765	101.6	3730	92.3	4322	811.0	243.3
Mehakar	636.3	5814	95.4	6957	80.9	5279	808.8	323.5
Motala	492.4	6940	73.7	1650	206.7	1100	454.4	181.7
Malkapur	415.9	3200	109.2	900	112.8	640	452.8	161.3
Nandura	483.5	4930	108.9	3340	82.3	3460	365.3	164.4
Khamgaon	467.2	6500	117.2	5700	98.5	5400	899.4	383.3
Shegaon	508.7	3190	106.3	2735	117.9	2285	639.0	223.6
Sangrampur	472.2	2000	131.0	2200	97.4	2000	733.7	221.1
Jalgaon (Jamod)	528.7	3820	146.8	4370	101.6	4150	587.0	205.4
Total	6550.3	58321	1386.7	41044	1326.8	36943	8463.8	3187.6

The Project

The present study located in Buldana district, where dal milling industries are located. Buldana district has area 9,600 sq. km. and population is about 22,32,000 according to 2001 census. The climate of Buldana district is dry and warm having an average rainfall of 70. 9 cm (Anon, 2010).

Table 2: No. of *dal* mills units in Buldana district

Sr. no.	Tehsil	No. of commercial dal mills	No. of mini dal mills
1.	Buldana	2	7
2.	Chikhali	1	3
3.	Deulgaon Raja	-	-
4.	Sindkhed Raja	-	-
5.	Lonar	-	1
6.	Mehakar	-	3
7.	Motala	-	1
8.	Malkapur	2	3
9.	Nandura	2	4
10.	Khamgaon	12	6
11.	Shegaon	-	-
12.	Sangrampur	-	2
13.	Jalgaon (Jamod)	-	3
	Total	19	33

A list of pulse processing industries of Maharashtra state was obtained from office of District Industrial Centre, Buldana. The dal mills located in Buldana district were visited by conducting extensive surveys. During the visit, detail information regarding the present status was collected in prescribed proforma (appendix I) including machines, instruments and equipment types, kind of crop processed, staffing pattern, problems regarding working, suggestions if any in order to improve the working pattern etc.

Selection of Sample

Cost Analysis

In the study, the status of existing pulse processing industries in Buldana district was studied. Data were collected with respect to capital investment, cost of production per annum, net income and employment generation in the *dal* mill. The cost analysis was conducted by calculating the parameters like BEP, pay back period, return on investment. There are 19 commercial *dal* mills and 33 mini *dal* mills in Buldana district. For the study, five commercial *dal* mills and five mini *dal* mills were selected.

It was observed that, the average Break even point (BEP), Pay back period (PBP) and Return on investment (RoI) for commercial *dal* mills were 40.37 percent, 0.50 years and 24.37 percent respectively and that for mini *dal* mills were 37.35 percent, 0.46 years and 50.2 percent respectively which implies that the pulse milling industries in Buldana district were techno economically feasible. The average employment generation for selected commercial and mini *dal* mills was found 2,274 and 402 man days per year respectively. There is a scope for installation of 126 new small *dal* mill plants in rural areas as cottage industries. It can improve the employment generation in rural areas.

Table 3: Coding of commercial *dal* mill

Sr. No.	Name of commercial dal mill	Coding	Processing capacity (q/day)
1.	Tulsi Agro Industries	A	400
2.	Maiyya Agro Industries	B	80
3.	Devki Agro Industries	C	150
4.	Shakambhari Dal Mill	D	140
5.	Akash Industries	E	60

Table 5. Cost analysis of commercial *dal* mill

Sr. No.	Particular	Sale purchase				
		A	B	C	D	E
1.	Cost of machine, Rs.	70,55,000	15,40,000	30,50,000	25,40,000	10,35,000
2.	Working capital/month	4,21,41,270	84,51,550	1,58,06,714	1,47,56,910	62,97,280
3.	Annual net profit, Rs.	1,38,21,577	41,16,674	44,79,184	46,31,790	19,13,817
4.	Break even point, %	35.11	32.10	45.37	42.38	47.10
5.	Pay back period, yrs	0.48	0.36	0.63	0.52	0.51
6.	Return on investment	26.08	32.44	21.10	23.22	19.03
7.	Employment generation, mandays per year	5,040	1,440	1,920	1,920	1,050

Table 6. Cost analysis of mini dal mill

Sr. no.	Particular	Custom hire				
		F	G	H	I	J
1.	Cost of machine, Rs.	40,500	78,500	74,500	49,500	73,500
2.	Working capital/month	14,045	11,185	16,330	13,720	16080
3.	Annual net profit, Rs.	1,49,150	1,26,493	1,46,410	97,290	1,36,940
4.	Break even point, %	32.38	36.60	36.43	44.67	36.70
5.	Pay back period, yrs	0.26	0.58	0.48	0.48	0.50
6.	Return on investment	57	48	59	36	51
7.	Employment generation, mandays per year	300	360	540	360	450

Table 7. Mini *dal* Mill Requirement in Buldana District

Sr. No.	Tehsils	Production tons/yr	Pulses convert into dal, 15% (tons)	Market potential, 75%	No. of dal mill units	
					Required	Available
1.	Buldana	9194.4	1331.9	7062.1	8	7
2.	Chikhali	15619.6	2341.2	13278.1	15	3
3.	Deulgaon Raja	9461.6	1429.1	8032.5	9	-
4.	Sindkhed Raja	12469.1	1870.3	10598.8	12	-
5.	Lonar	14180.4	2127.2	12053.2	14	1
6.	Mehakar	19937.2	3002.4	16934.8	20	3
7.	Motala	11510.7	1734.1	9776.6	11	1
8.	Malkapur	6354.1	963.2	5390.9	6	3
9.	Nandura	11374.7	1704.7	9670.3	11	4
10.	Khamgaon	21423.1	3221.1	18202	21	6
11.	Shegaon	10456.2	1573.4	8882.8	10	-
12.	Sangrampur	8411.3	1262.1	7149.2	8	2
13.	Jalgaon (Jamod)	14414.4	2167.3	12247.1	14	3
	Total	165806.7	21928.7	139278.4	159	33

Fixed cost

The cost does not vary with the change in output and remains unchanged for a longer period is called as fixed cost. This includes the cost of machinery, building, furniture, wages of permanently employed persons, license fee and taxes.

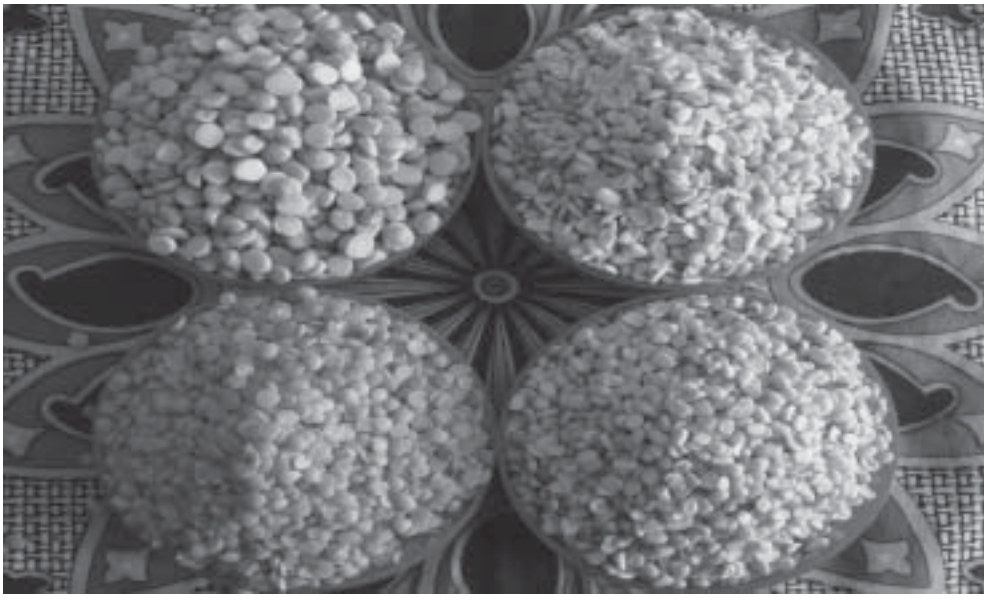
Variable cost

The cost changes with the change in output are called variable cost, which includes expenditure on wages of casual labour, oil and lubricant charges.

Inferences

Processing of agricultural product is one of the important means of adding value to produce and boosting up the supply of the food product. The study was based on sample of pulse processing mill

Processing of agricultural product is one of the important means of adding value to produce and boosting up the supply of the food product. The study was based on sample of pulse processing mill selected purposively from the vicinity of Buldana district



selected purposively from the vicinity of Buldana district. Table1 shows talukawise area under pulses (ha/yr) and production of pulses in tones/yr. (District Agricultural Centre, Buldana).

From table 1, area under pigeon pea is 6550.3 ha and the production is 58321 tons. For chickpea, 8463.8 ha and the production is 3187.6 tons. For green gram, 1386.7 ha and production is 41044 tons and for black gram, 1326.8 ha and production is 36943 tons. According to data obtained from District Industrial Centre (DIC), Buldana, there are about 19 commercial dal mills and 33 mini dal mills in Buldana in Buldana district.

The five commercial *dal* mill units and five small *dal* mill units in different categories for economic analysis were selected and coded as shown in Table 3 and Table 4.

It was observed during the survey that out of total production of pulses, about 75 per cent is processed by large scale pulse milling industry, about 10 per cent production is used for seed and other purpose and the remaining 10-15 per cent production is converted into dhal by small scale industries. The cost analysis of these *dal* mills are worked out and given in Table 12.4 and table 12.5. Five selected commercial *dal* mills were working on sale purchase basis whereas five selected mini *dal* mills were working on custom hire basis.

Big Profit

In case of sale purchase type commercial dal mill, the annual net profit ranges from Rs. 19,13,817/- to Rs. 1,38,21,577/- depending on the capacity of *dal* mill. BEP of processing units ranges between 32.00 to 47.10 which implies that all *dal* mills are techno economically feasible. The Employment generation ranged from 1,050 mandays/year to 5,040 mandays/year depending on the relevant capacity of the processing unit. The return on investment was found to vary between 19.03 to 32.44 percent which did not show any relationship with the capacity of the *dal* mill. The detailed cost analysis is given in Appendix-III(A).

In the case of custom hire type small *dal* mill, the annual net profit ranges from Rs. 97,290/- to Rs.1 ,49, 150/- depending on the capacity of *dal* mill. BEP of processing units ranges from 32.38 to 44.67, which imply that all *dal* mills are techno economically feasible. Their employment generation varied from 300 mandays/year to 540 mandays/year and depended on the capacity of the processing unit. The return on investment was found to be between 36 to 59 percent which do not show any relationship with capacity of the *dal* mill. The detail cost analysis is given in Appendix-III (B).

Assuming 15 percent pulses available for processing at small scale industries, 10 per cent for seed purpose and 75 per cent for market potential, the number of mini *dal* mills required in each taluka of Buldana district were calculated. Considering capacity of 150 tonnes/year of mini *dal* mill, the number of mini *dal* mill required is shown in Table 12.6.

From table 7, it is revealed that the total 159 mini *dal* mill units are required to fulfil the requirement where as only 33 mini *dal* mills are running in Buldana district. Hence, there is scope for 126 more units in Buldana district.

Conclusion

Economic analysis of the selected *dal* mills revealed that the *dal* milling is a profit making enterprise at all the capacity under study and on both sale purchase and custom hire mode.

The following conclusions can be drawn from the study.

1) The production of pulses in Buldana district is sufficient to fulfill the requirement of mini *dal* mill units.
2) The pulse processing industries are techno-economically feasible.
3) There is scope for starting 126 new small *dal* mill units in Buldana district if the present state of production of pulses is considered since they can get the raw material at village level and market the processed product.

**Suchita Gupta is Associate Professor and Head, CAET, Dr PDKV, Akola and *Dr. PB Kale is Additional Director of VANAMATI, Nagpur*

Groundnut Production in India

Scope for Extended Cultivation

By **Pathan. A. L.[1], Sananse S. L.[2] and Bhonde S. R.[3]**

India is the second largest producer of groundnuts after China. Groundnut is the largest oilseed in India in terms of production. On an average it accounted for 31.81 percent of the oilseeds production of the country. It accounts for around 25 percent of the total oilseed production of our country. The annual production of seed and oil is 5-8 and 1.5 million tonnes, respectively. About 80 percent of the total groundnut produced in India undergoes processing so that it can be utilised as oil or cake. Around 75 percent of the crop is produced in kharif season (June-September) and remaining 25 percent in rabi season (November-March).

Origin

It has been reported that South America was the place from where cultivation of groundnut originated and spread to Brazil, Southern Bolivia and North-western Argentina. Groundnut was introduced by the Portuguese from Brazil to West Africa and then to south-western India in the 16th century. Almost every part of groundnut is of commercial value. The groundnut oil has several uses but it is mainly used in cooking. It is used in many preparations, like soap making, fuels, cosmetics, shaving cream, leather dressings, furniture cream, lubricants, etc. In fact, it plays a pivotal role in the oilseed economy of India.

Groundnut was introduced by the Portuguese from Brazil to West Africa and then to south-western India in the 16th century. Almost every part of groundnut is of commercial value. The groundnut oil has several uses but it is mainly used in cooking

India is the second largest producer of groundnuts after China. Groundnut is the largest oilseed in India in terms of production. Gujarat is the largest producer contributing 25 percent of the total production, followed by Tamil Nadu (22.48 %), Andhra Pradesh (18.81%), Karnataka (12.64 %) and Maharashtra (10.09%) during 2006-07.

The southwest monsoon is the most important factor that determines the area sown, production and prices. The mean production of groundnut in the Maharashtra state was 3.94 lakh tonnes while at all India level it was 70.73 lakh tonnes The variability for the Maharashtra State was comparatively low (21.82 percent) and for the overall India level it was 20.51 percent. The per annum rate of growth was -4.70 percent for Maharashtra State and it was

significant at 1 percent level of significance. This indicated significant decrease in the production. The production of groundnut is decreasing in Maharashtra as well as in India. Therefore the government has to take measures to increase area and production.

This study seeks to know the world scenario of groundnut as compared to India and Maharashtra state. For this purpose, the data was collected from the secondary sources mainly from the state and central government reports, websites and also from published and unpublished sources.

Analysis of data is to be made with reference to the purpose of the study and its possible bearing on scientific discovery. For this purpose the statistical methods like Frequency,

Mean, Standard Deviation, Coefficient of Variation, Skewness and Kurtosis have been applied. Simple and compound growth rates were also estimated by standard statistical methods to know the simple and compound growth rates in area, production and productivity of groundnut.

In the result and discussion, an attempt is made to analyse the scenario of groundnut at global level in connection with the scenario at national level and Maharashtra state level. The collected data has been analysed statistically and the results are presented in the subsequent tables.

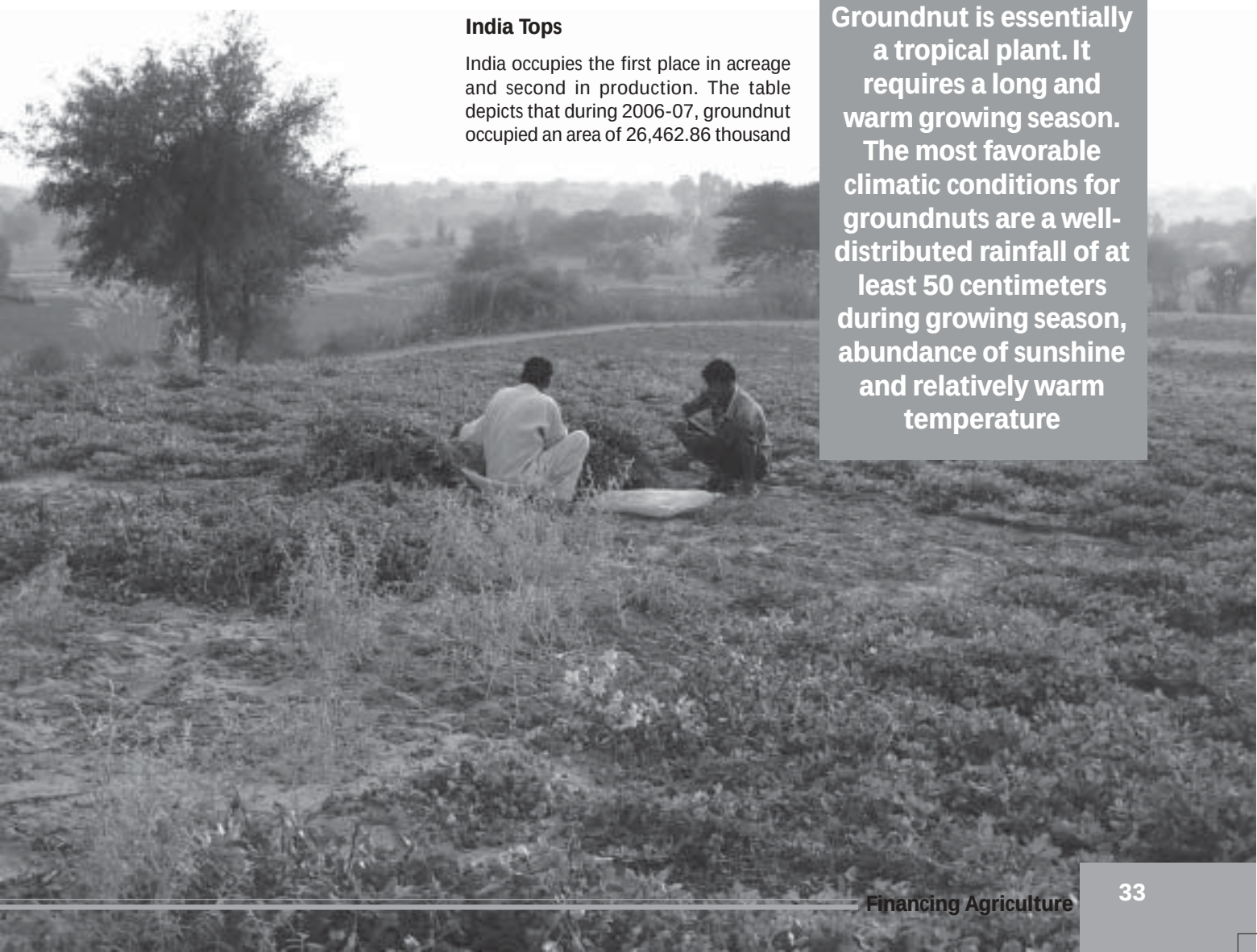
Area, production and average yield of major groundnut producing countries during the years 2004-05 to 2006-07 were collected. The analysis of data concluded that, the most important groundnut growing countries are India, China, Nigeria, Sudan and USA. It is grown over an area of 24.7 million hectares with a total production of 33 million tonnes in the whole world.

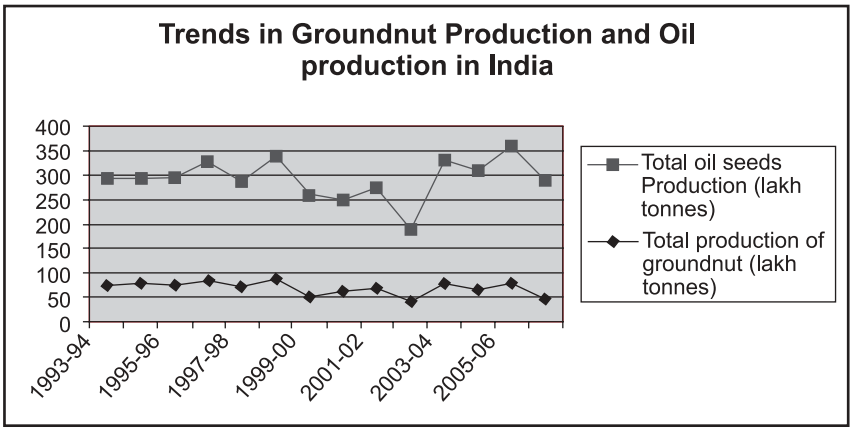
India Tops

India occupies the first place in acreage and second in production. The table depicts that during 2006-07, groundnut occupied an area of 26,462.86 thousand hectares with production of 35,658.43 thousand tonnes in the world. Groundnut is mainly produced in Asian countries. During the year 2006-07, China was the largest producer of groundnuts accounting for 37.71 percent of the total world production followed by India (21.03 percent). China and India, together accounted for about 58.74 percent of world groundnut production. Nigeria (7.57 percent), USA (5.27 percent), Indonesia (3.86 percent) and Sudan (3.37 percent) were the other major groundnut producing countries.

In area, India ranked first with 30.23 percent share in the world, followed by China (19.37 percent), Nigeria (10.58 percent) and Sudan (7.18 percent).

Being a rainy-season crop, groundnut does not require irrigation. Groundnut is essentially a tropical plant. It requires a long and warm growing season. The most favorable climatic conditions for groundnuts are a well-distributed rainfall of at least 50 centimeters during growing season, abundance of sunshine and relatively warm temperature





However, in productivity, United States of America stood first with 3540 kg/ha followed by China (2624 kg/ha), Argentina (2018 kg/ha) and Indonesia (2016kg/ha) during 2006-07.

Less Irrigation

Being a rainy-season crop, groundnut does not require irrigation. Groundnut is essentially a tropical plant. It requires a long and warm growing season. The most favorable climatic conditions for groundnuts are a well-distributed rainfall of at least 50 centimeters during growing season, abundance of sunshine and relatively warm temperature.

However, if dry spell occurs, irrigation may become necessary. Irrigation should be given at the pod development stage. The field should be well drained. In the southern part of the country where groundnut is grown in *rabi* season too, three to four irrigations are necessary. The first irrigation is given at the start of flowering and the subsequent irrigations whenever required during the fruiting period to encourage peg penetration and pod development. The last irrigation before harvesting facilitates the full recovery of pods from the soil

It is revealed from the analysis of data (1993-94 and 2006-07) that, the total groundnut production recorded a significant fluctuating trend between 1993-94 and 2006-07. The average groundnut production in India during the period was 70.73 lakh tones with *kharif* at 56.32 lakh tonnes and *rabi* at 16.61 lakh tonnes.

The highest production of 89.80 lakh tonnes was obtained during the year 1998-99,. Groundnuts assumed a significant position in India's oilseeds production during the years 1993-94 to 2006-07. In 1993-94, the total oilseeds production of India was 215 lakh tonnes, of which 36.42 percent was contributed by groundnuts.

In States

In India groundnut is grown over an area of 6.9 million hectares with total production of 5.3 million tonnes. Its cultivation is mostly confined to south Indian states, *viz,* Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. The other important states where it is grown are Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab. The yield of major groundnut producing states in India during the years 2004-05 to 2006-07 were analysed and the results showed that Gujarat was the largest groundnut producer (25 percent) during 2006-07, followed by Tamil Nadu (22.48 percent), Andhra Pradesh (18.81 percent), Karnataka (12.61 percent) and Maharashtra (10.09 percent).

In terms of area, Gujarat ranked first with 34.12 percent of total area during 2006-07, followed by Andhra Pradesh (24.71 percent), Karnataka (14.12percent), Tamil Nadu (9.24 percent) and Maharashtra (7.06 percent), whereas in productivity, among major producing states, Tamil Nadu stood first with 1784 kg/ha during 2006-07, followed by Maharashtra (1041 kg/ha) and Orissa (870 kg/ha).

Export Analysis

The data related to export were collected from web site of ***www.apeda.com.*** The data was collected for the three years 2005-06 to 2006-07**.** The data was mainly export of both types of

India exported both types of groundnuts i.e. groundnuts in shell and shelled groundnuts mainly to Indonesia, Malaysia, Netherlands, Philippines, Singapore, Sri Lanka, UK, Ukraine, USA etc.

groundnuts i.e. groundnuts in shell and shelled groundnuts. The analysis indicated that India exported both types of groundnuts i.e. groundnuts in shell and shelled groundnuts mainly to Indonesia, Malaysia, Netherlands, Philippines, Singapore, Sri Lanka, UK, Ukraine, USA etc. India has been a traditional exporter of HPS groundnuts. It has imported meagre quantity of shelled groundnut kernels and HPS from Norway and Japan, respectively. Indonesia, Malaysia, the UK, Ukraine, the USA, the Philippines, the Netherlands, Singapore and Sri Lanka are major groundnut importing countries. In 2006-07, India exported a total of 176,109.33 thousand kg groundnuts valued at Rs 54,430.45 lakh. The share of groundnuts in shell was 39,779.84 thousand kg valued at Rs 11,039.43 lakh.

Maharashtra

To know the trends in area, production and productivity of groundnut in Maharashtra, the time series data for the period from *1993-94 to 2006-07* were collected from Government. reports and analysed. The analysis indicated that about 60 percent of the groundnut grown in Maharashtra was under Spanish Bunch Varieties, which is mainly confined to the northern part of the state in the regions of Khandesh, Vidharba and parts of Marathwada.

Evolution of Spanish Bunch Variety with early maturity (because of the short duration monsoon rains) and tolerant to drought and rust is specially suited for these regions. In the Marathwada region, specially in the districts of Osmanabad and Beed districts, Virginia Runner type varieties are grown, because these two districts get rains from both South East and North West monsoons.

The area, production and productivity of groundnut grown in Maharashtra State were analysed statistically and the results indicated that the area under groundnut in Maharashtra State has shown continuous decreasing trend in the acreage under the crop, since 1993-94. The area under the crop was 5.105 lakh hectares during the year 1993-94 which came down to 3.416 lakh hectares during 2006-07, showing more than 33 percent decrease. The year 2005-06 recorded the lowest acreage (3.367 lakh hectares) under the crop due to drought conditions through out the State. Similar trend has also been observed in production and productivity of groundnut

It was observed that the production and productivity of groundnut in the State has shown continuous decreasing trend throughout the period under study. The production has been the lowest during the year 2006-07 which was 2.541 lakh tonnes, while it was 5.12 lakh tonnes during 1993-94. . Similar trend was also observed in productivity of groundnut in the state. In mid-nineties the productivity of groundnut was observed to be more than a tonne per hectare which came down to 848 kg/ha during the year 2001-02 with further reduction to 744 kg/ha, during the year 2006-07. Thus, the Maharashtra State has been the poor performer all the way from the year 1980-81 without a significant increase in acreage and production of groundnut. These findings are in conformity with findings of Talwar (2003), Ms. Sawant and others (1999).

Variability Analysis

The variability in the production gives years to years fluctuations in the production . This gives us an idea about stability or instability in the production. Therefore, an attempt has been made to analyse the production of groundnut. In Table 1, the values for the Arithmetic Mean, Standard Deviation and Co-efficient of Variation have been presented at Maharashtra and overall India level. The mean production of groundnut in the Maharashtra state was 3.94 lakh tonnes while at all India level it was 70.73 lakh tonnes . The standard deviation and coefficient of variation indicated more fluctuations in production of groundnut at various levels. The variability for the Maharashtra State was comparatively low (21.82 percent) and for the overall India level it was 20.51 percent.

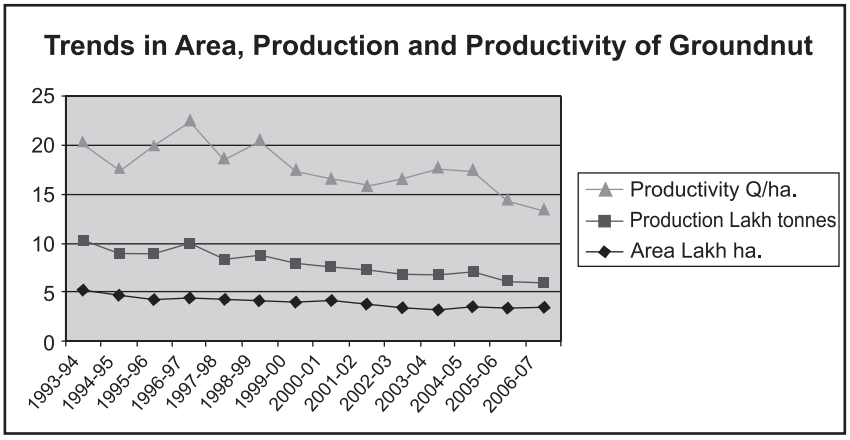
This has indicated comparatively low instability in production of groundnut at all India level than the Maharashtra State. This has been only because of other groundnut producing States like Andhra Pradesh, Karnataka and Tamil Nadu have performed well in production of groundnut. The values of skewness and kurtosis indicated non normality in the data of production.

Table: 1 Mean, Standard Deviation (S.D), Coefficient of Variation (CV %), Skewness and Kurtosis of *Production of Groundnut* at Various Level.

(1993-94 to 2006-07)

State/Country	Mean Production Lakh toonns	S.D. of Production Lakh tonnes	CV %	Skewness	Kurtosis
Maharashtra	3.94	0.86	21.82	0.288	-0.295
India	70.73	14.51	20.51	-0.84	-0.159

Trends in Area, Production and Productivity of Groundnut in Maharashtra *(1993-94 to 2006-07)*



Exponential Growth

Growth in the production of the crop gives us an idea about the increase or decrease in the production of the crop. This helps the Government or the planners about the availability of the product, and it further helps to estimate the availability and demand or requirement. Accordingly, Government or planners can take decisions about import or export of the commodity. Considering the present growth the future availability can be forecasted. Thus, the growth analysis is very important for this purpose. Therefore, linear and compound growth rates have been estimated and presented below.

Linear Growth Analysis

The linear growth gives change in values of production for unit change in the time period years. The analysis was performed with the help of SPSS software and the results are presented in Table2.

Table 2 indicates that the regression co-efficient for production of groundnut has been negative at State and national level. This indicated the decreasing trend in production. For India, the regression co-efficient was negative and statistically non-significant whereas at state level it was negatively significant. This indicated overall negative growth in production of groundnut. This is a problem of concern. Therefore, efforts are to be made to increase the production otherwise we have to rely on import of the oil seed.

Exponential Analysis

The compound growth rate gives on an average year to year change in production in terms of percentages. Therefore, in almost all the Govt. and other reports, the growth rates are estimated. Therefore, by using exponential model, the growth rates were estimated with the help of SPSS software. The results are presented the following Table 3. It can be seen from Table 3 that, the overall per annum rate of growth was -4.70 percent for Maharashtra State and it was significant at 1 percent level of significance. Further, at overall India level, the growth rate was -2.50 percent.

The growth rate for all India level has been statistically non-significant indicating negative growth in production of groundnut in the country. Thus, the production of groundnut is decreasing in Maharashtra as well as in India. Therefore, Govt. has take measures to increase area and production of the country.

Table 2: Linear Growth Analysis of Production of Groundnut

(1993-94 to 2006-07)

State/Country	Intercept of Constant (a)	Regression Coefficient (bi)	t value	R^2 Value
Maharashtra	5.27	-0.177**	5.886	0.743**
India	82.45	-1.563 NS	1.74	0.203 NS

**: Statistically significant at 1% level of probability NS: Non significant

Table 3: Exponential (Compound) growth rates of Production of groundnut

(1993-94 to 2006-07)

State/Country	Intercept	Compound growth rates (%)	t value	R^2 Value
Maharashtra	5.463	-4.70**	6.34	0.77**
India	4.420	-2.50NS	1.72	0.198NS

**Statistically significant at 1% level of probability NS: Non significant

The writers are 1. Research Scholar 2. Associate Prof. of Statistics at Dr. B. A. Marathwada University, Aurangabad. 3 Additional Director, National Horticulture Research and Development Foundation (NHRDF) in Nashik

QUICK FACTS

- Groundnut is the major oilseed of India. It accounts for around 25 percent of the total oilseed production of our country.
- The annual production of seed and oil is 5-8 and 1.5 million tonnes, respectively.
- About 80 per cent of the total groundnut produced in India undergoes processing so that it can be utilised as oil or cake.
- Around 75 per cent of the crop is produced in *kharif* season (June-September) and remaining 25 per cent in *rabi* season (November-March).
- The southwest monsoon is the most important factor that determines the area sown, production and prices.
- The mean production of groundnut in the Maharashtra state was 3.94 lakh tonnes while at all India level it was 70.73 lakh tonnes
- The variability for the Maharashtra State was comparatively low (21.82 per cent) and for the overall India level it was 20.51%..
- The per annum rate of growth was -4.70 per cent for Maharashtra State and it was significant at 1% level of significance. Indicated significant decrease in the production.
- The production of groundnut is decreasing in Maharashtra as well as in India. Therefore, Govt. has take measures to increase area and production of the country.

Economic Potential of Drumstick Farming

By **D. Muthamizh Vendan Murugavel ***

Drumstick is one of the world's most useful trees with potential to improve nutrition, boost food security, foster rural development and support sustainable land care. From leaves and root to pods and seeds, all parts of the drumstick tree are highly edible.

The drumstick is the most widely cultivated species of the genus ***Moringa***, which is the only genus in the family Moringaceae. Its botanical name is **Moringa oleifera**. It is an exceptionally nutritious vegetable tree with a variety of potential uses.

The tree itself is rather slender, with drooping branches that grow to approximately 10 m in height. The drumstick tree named for its long bean-like fruit produces fruit and leaves for more than nine months of the year. It does not need artificial fertilisers or pesticides, and requires very little space to thrive. In cultivation, it is often cut back annually to 1 metre or less and allowed to re-grow so that pods and leaves remain within arm's reach. It is an extremely fast growing tree, drought tolerant and leaves and pods are of high nutritional value.

While it grows best in dry sandy soil, it tolerates poor soil, including coastal areas. It is a fast-growing, drought-resistant tree. The drumstick tree is native to India, Arabia and parts of Africa. The earliest written evidence of its cultivation is from 2000 BC. Today it is widely cultivated in Africa, Central and South America, Sri Lanka, India, Mexico, Malaysia, Indonesia and the Philippines. In the tropics, it is used as forage for livestock.

Nutritional value of drumstick leaves

Drumstick leaves are full of essential disease-preventing nutrients, they contain:

- Seven times more Vitamin C than oranges to fight many illnesses including colds and flu;
- Four times more Vitamin A than carrots to protect against eye disease, skin disease, heart ailments and diarrhoea;
- Four times more Calcium than milk to build strong bones and teeth;
- three times more Potassium than bananas essential for the functioning of the brain and nerves; and,
- Nearly equal amount of Protein as in eggs which are basic building blocks of all our body cells.

Medicinal Uses

The drumstick is valued mainly for its tender pods, which are relished as vegetable but all its parts – bark, root, fruit, flowers, leaves, seeds and even gum – are of medicinal value. They are used in the treatment of ascites, rheumatism and venomous bites as antiseptic and as cardiac and circulatory stimulants.

Drumstick leaves are rich in vitamins A and D, iron and calcium. It helps in the stable functioning of the digestive system apart from strengthening the bones. The leaves also contain two chemicals with potential anti-cancer effects. The seed oil does not turn rancid, but it is not healthful because it is full of saturated fatty acids that are bad for the heart and blood vessels.

Fresh root of the young tree (as also the root bark) is used as rubefacient and vesicant. Internally, it is a stimulant, diuretic and antilithic. Externally, it is applied as a plaster or poultice to inflammatory swellings. The root bark contains chemicals that stimulate the heart but also raise blood pressure. The root, in prescribed doses, is given in intermittent fevers, paralytic affections, epilepsy and hysteria and externally in palsy, chronic rheumatism, enlargement of spleen, dyspepsia and also in bites by rabid animals.

A compound spirit made of the roots and orange peel with a little bruised nutmeg is useful in fainting fits, giddiness, nervous debility, spasmodic affections of the bowels, hysteria and flatulence. A decoction or infusion of the root with the addition of bruised mustard seeds is used in ascites caused by diseases of the liver and spleen. This decoction or infusion is also useful as a gargle in soreness of mouth and throat, and pain in the gums due to dental caries. Freshly extracted juice of the root bark is used to relieve otalgia by pouring it into the ears and also into the hollow of the tooth in cases of dental caries.

Its seeds are acrid and stimulant. The oil of the seeds is applied in gout and rheumatism. The leaves are rich in vitamins A and C and are considered useful in catarrhal affections. The juice of the leaves is dropped into the eyes in fainting fits caused by nervous debility, spasmodic affections of the bowel, hysteria and flatulence. The juice is mixed with honey and applied to the eyelids in cases of eye diseases. A paste of the leaves is used as an external application for wounds. Poultice of the leaves is useful in reducing glandular swellings.

Excellent oil is derived from the seeds, which is used for cooking and lubrication of delicate mechanisms. The leaves are extensively used as a vegetable in many parts of the world, and the root can be made into a condiment similar to horseradish. Its flowers are used as stimulant, tonic, diuretic and cholagogue. They are useful in increasing the flow of bile. Its gum, mixed with sesamum oil, is dropped into the ears in otalgia. The gum, rubbed with milk and made into a paste, can also be applied to the temples in headache.

It is also applied to buboes and to painful bones in syphilis. The pods made into a soup are prescribed as a diet in sub-acute cases of enlarged liver and spleen, articular pains, tetanus, debility of nerves, paralysis, pustules, patches and leprosy. The flowers, leaves and roots are part of folk remedies for cancer. The leaves are a poultice for sores and headaches, and they are also used as a digestive in small doses. The root juice has counter-irritant properties similar to proprietary pain balms. The inflammation it evokes reddens the skin sufficiently to make it popular as a beauty aid.

Drumstick trees have been used to combat malnutrition, especially among infants and nursing mothers. A curry made from the unripe pods acts as a preventive against intestinal worms. Drumsticks other miraculous quality-its ability to purify water-has been used by households for centuries. But it has only recently been tested commercially. Powdered Moringa seeds, when added to murky, bacteria-laden water, act as a coagulant, binding to the bacteria and silt and falling to the bottom of the vessel. The clean water can then be poured out.

Research has shown the drumstick tree to be of exceptional nutritional value. The leaves are 38 percent protein with all essential amino acids, which will be of interest to vegetarians, or people who wish to cut back on meat and dairy products, or regions where protein is lacking. Seeds crushed to a powder are used to clarify turbid, dirty water. The cleansing takes place by a process of electrical charges established between the muddy particles suspended in the water and the pulverised seeds, and gradually, after about an hour, the muddy particles are pulled to the bottom of the water by the force of gravity. Research shows that the seed not only settles the mud, but can carry with it over 90 percent of bacteria and viruses. A report published in New Scientist, December 1983, said that the seeds have been used in Sudan and Peru to purify muddy river

Big Money from Drumstick: A Farmer's Success Story

For most people, the drumstick may be a mere vegetable and a tree (*Moringa oleifera*) with triangular, ribbed pods and winged seeds. But Balasaheb Marale, a farmer from Shaha village in Maharashtra, discovered its commercial potential in a big way by growing this green-skinned, stick-like vegetable. Marale cultivated the drumstick with remarkable success in his drought-prone village and inspired many other farmers to follow suit.

This farmer in his mid 30s gave up his job as a machine operator in Pune to take up farming in his village. He was soon forced to look beyond conventional crops because his land was unfit to yield even a bag of grain. There the farmers were reluctant to try drumstick. Drumsticks first caught Marale's attention at a local market. Subsequently, he toured Maharashtra and met around 190 drumstick growers most of whom had failed in their efforts due to inadequate knowledge about the crop. Over the next few months, Marale travelled to some southern Indian states where drumstick is grown. "I grew convinced that drumstick was the ideal crop for dry regions," he says.

This school dropout displayed his passion for this crop through a book he penned on drumstick cultivation and set up his own website on the subject. Says Marale, "Little research has been done on drumsticks and their commercial farming". Drumstick cultivation can be a way out for hundreds of desperate, debt-ridden farmers who may unfortunately take their lives when crops fail.

The crops and products of the drumstick tree have multiple uses. The tree's bark, roots, fruit, flowers, leaves, seeds and gum also have medicinal uses including as an antiseptic and in treating rheumatism, venomous bites and other conditions. Growing the drumstick makes eminent sense in India where irrigation is patchy and creaky.

The drumstick can be grown using rainwater without expensive irrigation techniques. The yield is good even if the water supply is not there. While it takes only Rs 5000 per acre to farm drumstick, the returns are high; it will range from Rs 25,000 to Rs 45,000. The tree can be even grown on land covered with 10-90 cm of mud.

Recalls Marale: "I returned to my village with 15 varieties of drumstick seeds and a wealth of information". Marale applied for a bank loan to grow drumstick. The loan took a while to arrive because the bank knew little about the tree's commercial potential. Marale's family and fellow villagers thought he was mad to give up a job to begin growing drumsticks in a parched village. But the drumstick man proved the sceptics wrong. He cultivated drumstick on an acre of land, providing water once a week. And when he earned nearly Rs 36,000 after selling the crop in the first 14 months, many farmers took notice.

Marale now grows drumstick on four acres with the same amount of water he once used for an acre. "As ours is a low-rainfall area, I have devised my own water conservation techniques," he says. He also exports his produce to the UK, Singapore and France.

Anurag Kenge, another enthusiast and owner of a software firm was exploring the option of growing drumstick on his farm at Lasalgaon, a town in Maharashtra. Farmers had avoided drumstick as they thought it brought bad luck. He had tried it out earlier, but without success. After reading Marale's book, Kenge met him for tips. He learnt that Marale wanted to share his experiences with more farmers and seek out export opportunities. "The internet was the best way to do it," says Kenge.

The two joined hands to create a portal with information about drumsticks, their characteristics, farming techniques, recipes and medicinal usages. "The response has been tremendous," says Marale. The website received over 300,000 hits. Marale regularly responds to emails from India and countries like Sri Lanka, China, Taiwan, Indonesia, Switzerland and Kenya. Now he guides Indian farmers and delivers lectures on the virtues of drumstick farming. Hundreds of farmers from various parts of the country flock to his village. Around 25 farmers in his village have brought more than 40 acres of land under drumstick cultivation and are targeting another 100 acres in the near future. Farmers in his district have started eight group farming initiatives and are exporting around 500 tonnes of drumstick.

-Courtesy BBC

water. It was also reported that seeds have antimicrobial activity. The seeds also have potential for treating sewerage water.

The future looks very promising for Moringa especially in the formulation of medicine and in the manufacture of perfumes and cosmetics.

Market for Drumsticks

There is ample market for drumsticks in metro cities like Hyderabad, Mumbai, Pune, Nashik, Surat and others. Drumsticks also have demand in Rajasthan. Drumsticks have highest demand in Singapore. Since the Drumsticks has antibiotics such as Penicillin it has much more demand in countries like England, Japan, Canada, Bangkok, Doha, Dubai, Baharain, Muskat, Daman etc.

Drumstick is considered one of the world's most useful trees, as almost every part of the Moringa tree can be used for food or has some other beneficial property. According to Ayurveda, there are at least 300 medicinal uses of the drumstick plant. In spite of its uses, many people even in rural areas are not aware of this wonderful plant. As with many reports of the nutritional or medicinal value of a natural product, there are an alarming number of purveyors of healthful food who are now promoting Drumstick as a panacea. Drumstick holds promise as a sustainable crop which can benefit humans nutritionally, economically and as an energy source.

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AGRI NEWS

Grain Output to touch 230 Million Tonnes

Agriculture Minister Sharad Pawar has stated that India's foodgrain output was expected at 220-230 million tonnes in 2010-11, with rice production expected to be significantly higher than the preceding year. "Monsoon this year has been good. The conditions for rice have been very favourable. I expect the overall foodgrain production to reach between 220-230 million tonnes because of the good monsoon".

"But because of deficient rainfall in major rice producing states such as West Bengal, Bihar and Jharkhand, paddy production may not be as good as we had initially expected," the minister added. "Yet, the good southwest monsoon will also be favourable for the wheat crop. Reservoirs are full. The level of water in Bhakra Dam for instance is not seen in last 30 years. My expectation after talking to the states is 2010-11 will be bumper crop year."

India is estimated to have produced 218 million tonnes of grain this year because of bad monsoon, against the target of 239 million tonnes set at the beginning. In 2008-09, the grain output was at a record 234.47 million tonnes.

Pawar said with ever increasing input costs, there was a need for optimum returns on investments and inputs. Accordingly, wastage in storage needed to be reduced, the food supply chain improved and incentives made attractive to bring in private investment.

India's Food Grain Output in Kharif Season to be 115 MT

India's total foodgrains production is likely to be 114.63 million tonnes (MT) in the Kharif season as compared to the fourth advance estimates of a production of 103.84 MT in 2009-10. According to the First Advance Estimates of major crops grown in the country in the Kharif season released on 21 September, rice production in the country this season is likely to be 80.41 million tonnes as compared to 75.91 million tonnes in 2009-10 Kharif. Production of Kharif pulses is expected to be 6 million tonnes as against 4.30 million tonnes last Kharif. Oilseeds production in the Kharif season is likely to be 17.27 million tonnes as against 15.66 million tonnes last season.

Cotton production is estimated to be 335 lakh bales, up 96 lakh bales from the last year's estimates. Sugarcane production is estimated to be 324.91 million tonnes as against 277.75 million tonnes in 2009-10. Production of jowar has been estimated at 3.22 MT (as compared 2.82 in 2009-10), maize 14.06 MT (12 MT), coarse cereals 28.23 MT (23.63 MT), cereals 108.64 MT (99.54 MT), tur 3.27 MT (2.55 MT), urad 1.08 MT (0.85 MT), moong 0.88 MT (0.44 MT), groundnut 5.64 MT (3.66 MT), castorseed 0.95 MT (0.99 MT), sesamum 0.62 (0.66 MT), sugarcane 324.91 MT (277 MT), jute and mesta 10.28 m bales (11.29 m bales).

Assam Tops in Rice Yield in Eastern India

Assam has been awarded the best performing State in rice production in eastern India.

Union Agriculture Minister Sharad Pawar presented awards at the two-day National Rabi Conference in New Delhi on 18 September. The awards were in the category of best performance in production and productivity in National Food Security Mission (NFSM) districts, to the States of Assam (Eastern) for rice, Punjab (western region) and Bihar (central eastern) for wheat; Uttar Pradesh (central western), Andhra Pradesh (southern) and Maharashtra (central eastern), Tamil Nadu (southern) and Orissa (eastern) for pulses.

The two-day National Rabi Conference in New Delhi on 18 September evolved a detailed region-wise strategy for the coming Rabi season. The strategy was to improve the productivity of crops to make the best use of available moisture in the soil. The awards were given at the conclusion of two-day National Conference on Agriculture for Rabi Campaign-2010.

The conference recommended that the States would ensure timely availability of inputs to farmers. They would also work to bring more areas under boro rice and encourage farmers to plant wheat early. States that have received less rainfall during the monsoon season have been advised to implement the contingency plan already prepared and use the available soil moisture to sow crops that require less water.

AGRI NEWS

Godrej Agrovet Limited setting up VC Fund for Agri start-ups

Omnivore Capital is an early stage agri-tech venture capital fund that will invest in India, US, and Canada. It focuses to invest in innovative solutions that improve the agricultural productivity and sustainability. According to the Omnivore's website, the focus area for investing includes agricultural financial services, agriculture services, animal science, aquaculture and marine culture, bio-fuel biotechnology, farm equipment, plant science, sustainable inputs, water management in agriculture.

Omnivore's team consists of Atish Babu and Mark Kahn and will invest US$5 million in each portfolio company over its lifecycle with the initial investment of US$1million to US$3 million in a Series A or Series B round of financing.

Godrej Agrovet is a strategic investor in the fund with US$ 5 million agri business of the Group; it deals with products and services that increase crop and livestock yields. It has interests in animal feed, oil palm plantations, agri-inputs and poultry, and registered total sales of Rs 1,576 crore in 2009-10. Godrej is a diversified conglomerate with the interests in Real estate, FMCG, industrial engineering, appliances, furniture, security and agri care.

There are number of Venture Capital funds that invest in agriculture such as Nexus Venture Partners, Nine River Capital, Helion ventures and Matrix Partners India.

ICAR Plans Rs 2300 Crore Programme for Farm Sector Boost

The Indian Council of Agricultural Research (ICAR) has chalked out Rs 2,300-crore programme on various projects, including research. These initiatives include gearing up to meet new challenges in climate change; public-private partnership projects and programmes to make more people take to agriculture as a livelihood. "We are working deeply in all aspects in the country on climate change," ICAR Director-General, Dr S. Ayyappan said in Chennai recently.

"Now every state is coming up well in the agricultural sector, with many touching close to about 2.8 percent. However, our annual agricultural growth rate target is about four per cent," he said.

The PPP initiative will benefit both the sectors, besides the farmers. "More emphasis on innovation and interaction between the two sectors may result in more synergy among them," he said. To lure more people to take up agriculture as livelihood, various initiatives like farmers' training and capacity building for more innovative agricultural practices have been chalked out. "We are also trying to bring them to higher stage by identifying innovators in each district and giving them awards at the national level", he said.

Seminar on Safety of Indian Food in BHU

A three-week summer school for agricultural scientists on the topic *Food Safety and Quality for Global Competitiveness of Traditional Foods of India* opened at the Banaras Hindu University (BHU) on 15 September. According to programme coordinator Alok Jha, the summer school is a part of mid-career training programme for agricultural scientists belonging to various agricultural institutes and universities, including the Indian Council of Agricultural Research (ICAR), New Delhi, where key issues of safety and quality of traditional Indian food would be discussed. It would include different types of cereal-based, milk-based and vegetable-based food items that were demanded in foreign countries, he added.

Executive director, National Agri-Food Biotechnology Institute (NABI), Mohali (Chandigarh), Rakesh Tuli inaugurated the summer school. Assistant director general, ICAR, Kusumakar Sharma, senior faculty members including Director, Institute of Agriculture Science (IAS), BHU, SR Singh and Dean, Kalyan Singh, were present.

ICAR, New Delhi, is sponsoring the programme in which 17 agricultural scientists from different parts of the country are participating.

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