

TRANSFER OF TECHNOLOGY TO TARGET GROUPS

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The words 'Transfer of Technology' are borrowed from the industry, which mean transfer of technology from one country to the other. But in the context of Extension these words imply transfer of research findings or technology or practices from the research institute / station to the farming community or from the researcher to the farmer with or without the involvement of extension agency. Technology transfer includes efficient transfer of agricultural innovations to the farmers and the provision of pre-requisites needed to make adoption possible (Arnon, 1989).

1. TECHNOLOGY

Man is involved in experimentation with nature in a bid to gain control over it and in the process he developed various methods, practices and techniques to help him live comfortably. These discoveries and inventions are referred to as technologies. Karl Marx defined technology as "Man's mode of dealing with nature, the process of production by which he saves his life, and thereby bears the mode of formation of social relations and of the mental misconceptions that follow from them." Technology is an organized body of knowledge, which is being utilized to solve various problems experienced by mankind.

The impact of technology on the physical, social and economic aspects is tremendous and a stage has come that technological advancement and development are considered synonymous. All the revolutions accomplished by mankind in any country are in fact the consequences of technological advancements. For example the industrial revolution in the Western countries, ; Green, White, Yellow and Blue revolutions in India are a result of technological applications. It is obvious that lot of emphasis is given to technology development and its transfer to the client with a primary aim of increasing production.

The technology is predictive, problem-solving and innovative in nature. However, no single technology can claim its role in development entirely. Depending upon the nature and origin, the technologies are classified into western versus local; traditional versus sophisticated / advanced / modern; appropriate versus alternative; scientific versus indigenous technologies. Immaterial of the classification, the worth of a technology lies in its extent of use. A constantly changing technology was conceived by Mosher (1966) as one of the conditions necessary for agricultural development.

1.1 Differences between Transfer of Technology and Extension

One of the goals of extension is to transfer technology and in the process the extension agent is involved in education of farmers as well as arranging for the technical inputs and services, and hence, many people consider extension and transfer of technology as one and the same. However, Swanson and Claar (1984) argued that though extension is an essential and major part of technology transfer the terms are not synonymous. Transfer of technology includes additional 'function of technical input services. On the other hand extension is concerned mainly with education of farmers on management of resources and decision-making skills, which may contribute to technology transfer. Hence, it is necessary to understand that the focus of extension is on education of the farmers rather than supply of technical inputs and services. Because of the misconception about the role of extension, many institutions lay emphasis on supply of inputs and technical -services, which are included as extension activities. However, extension agencies 'frequently engage in activities that are not directly connected to extension education such as provision of inputs, supervising credit repayment, enforcing 'government regulations, providing statistical information, organizing cooperatives etc, (Arnon, 1989). Whether supplying of technical inputs and services is a part of 'extension' or not is still a debatable issue.

1.2 Significance of Animal Husbandry Extension

In India, Animal Husbandry Extension is still in its infancy. Though the Animal Husbandry sector is offering lot of potential and promise, there is little realization on the part of the policy makers in recognizing the need of Animal Husbandry Extension in livestock development. This neglect is mainly attributed to:

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- transmitting of information for crop production has been a major priority for most extension services but not livestock production, although the demand for livestock products is growing more rapidly than demand for crops.
- the focus of animal husbandry extension is on animal health rather than production aspects (Matthewman & Morton, 1995).
- the main emphasis in the state animal husbandry plans is on the delivery of curative veterinary and AI services and there is little emphasis on activities such as disease prevention, extension and training and feed and fodder development (Ahuja and others, 2000).

However, with increase in the per capita incomes, and increase in the demand for livestock products and improvement in the marketing network for these products, the potential of animal husbandry extension in transferring livestock information is well recognized.

1.3 Livestock Rearing

More than 70 million households own livestock in India and most of them are poor. Majority of these households own bovines. About five million families own small ruminants. Livestock rearing especially dairy farming is recognized as an instrument of socio-economic change mainly for the landless, marginal and small farmers who depend upon agriculture for their livelihood. Livestock rearing is an important secondary occupation, which supplements their income. In rural areas especially the landless depend primarily on cattle rearing because the scope for other employment opportunities is limited (Ramkumar and Rao, 2001). It helps them to utilize extra labour especially when opportunity cost on family labour is almost zero. Their system of livestock rearing is characterized by rearing of few low productive animals, maintained in the shade of trees or on the side of their dwellings. Whatever little production they get from their animals is almost at zero cost as the animals are maintained on low cash inputs, which include straws and grasses. Grazing of animals is the common practice followed by this segment of livestock owners. Their main advantage is that they can utilize surplus labour for rearing of livestock.

The contribution of landless and of those who own one or two cattle heads to the total milk production is quite substantial (Candler and Kumar, 1998 and De Leeuw et al, 1999).

The Government of India has come out with various programmes to ameliorate the condition of these oppressed or low income groups of people through livestock rearing. However, the schemes are not very successful for the following reasons:

- i. The technologies developed are not suitable for them as they were developed on research stations which are similar to the farming conditions of resource rich farmers but entirely different from those of resource poor farmers.
- ii. Demonstration trials were never conducted on these poor livestock owners' animals and the technologies were never put to test on these animals.
- iii. Researchers always aimed at developing technologies to increase production per animal instead of production per rupee invested, which may not be the objective for many a poor livestock owner who certainly cannot afford high input technologies.
- iv. Till date efforts were never made to conduct on farm trials on indigenous animals especially under the ownership of poor livestock owners. This segment of the livestock owners would like to rear indigenous or local animals for obvious reasons. But the technologies to increase their productivity are scanty.
- v. Poor livestock owners would always like to rear few indigenous animals which are low productive rather than one or two high yielding crossbred animals mainly because of their low risk bearing capacity.
- vi. Although there was emphasis on production of low cost technologies much headway could not be made by the researchers in developing such technologies.
- vii. Even today despite all these technological advancements claimed in different areas the fact remains that the production, processing and transportation of all the livestock products is still unorganized. It is said that the unorganized sector (vendors and contractors) is handling about 70 to 80 per cent of livestock products in the country. The Operation Flood accounted for only 6.3 per cent of total milk production and 22 per cent of marketed milk (Candler and Kumar, 1998).

The production of substantial quantity of livestock products is in the hands of a large number of scattered small livestock owners, which is considered a good sign keeping in view the slogan of Mahatma Gandhi "Production by masses and not mass production" which is relevant even today to the Indian conditions.

2 EARLIER ATTEMPTS

The efforts of Animal Husbandry Extension date back to 1952 when the Key Village Scheme was introduced in the country to improve the breeding and health of the animals. Later, a number of schemes or projects have been introduced to transfer the technologies and thereby increase the production of livestock.

Despite claims by various agencies about the successful transfer of technologies and the ensuing production revolutions, the fact remains that many of the technologies were either rejected or discontinued by majority of the livestock owners especially those in the lower economic stratum. The challenge of transferring the technologies to a vast majority of livestock owners to improve their socio-economic condition still remained insurmountable. In the process of finding an appropriate solution for this perennial problem, efforts were made to develop suitable models to transfer the technologies and no model is devoid of weaknesses and failed to accomplish the desired goals. These models are discussed below.

2.1 All India Key Village Scheme

The Key Village Scheme (KVS) was a novel attempt made by independent India towards the development of cattle and buffaloes. The basic aim was to bring about rapid improvement in the production potentiality of milch animals through improved breeding, effective health care, and scientific management and organized marketing facilities.

The scheme was conceived as one of the most important programmes for livestock development in the country. Artificial Insemination (AI) was included as an integral part of the technical programme. It envisaged establishment of Key Village Blocks in breeding tracts of bovines and each block consisted of one AI centre and four key village units to cover about 10,000 breedable cows and buffaloes. The scheme was evaluated at different phases and by 1962 it was very well realized that it failed to evince the desired impact and that too a large number of dairy plants were unable to collect sufficient quantities of milk.

The reasons for failure include establishment of centers in the states where there were no recognized breeds, creating confusion in the personnel of Animal Husbandry Departments (AHDs) by introducing lot of modifications in the scheme, inadequate attention paid to the fodder development and in the establishment of marketing cells.

2.2. Intensive Cattle Development Project (ICDP)

When KVS did not yield the expected results the Government of India introduced another comprehensive project, Intensive Cattle Development Project (ICDP) almost on the similar lines of Intensive Agricultural District Programme in the year 1963.

The ICDP was started as a Special Development Programme during Third Five Year Plan. It was envisaged to locate the projects in the breeding tracts of indigenous breeds of cattle and buffaloes and in the milksheds of large dairy projects. The establishment of ICDPs was linked with the dairy plants so as to enable the dairy plants to collect and process milk to their full capacities. Each ICDP was expected to cover 0.1 m breedable female bovine population and to provide necessary inputs and technical services.

The ICDP was considered as the most determined effort to increase milk production and productivity of cows and buffaloes. However, the Programme Evaluation Organization (1970-71) in its evaluation report indicated that the ICDPs also did not succeed in accomplishing their objectives. The reasons identified were i) considerable time lag in providing organizational structure and various inputs ii) set-back in transferring ICDPs to state sector with financial cuts resulting in dilution of inputs and iii) wastage of semen to the tune of 30 - 40 percent of the semen supplied to project area.

In addition, a dairy extension officer post was created in each and every ICDP to give fillip to the extension activities but was not filled up in most of the ICDPs. Even in those places where they were posted they were not involved in education of livestock owners and instead their activities were confined mostly to supply of inputs or other non-extension activities.

At present the ICDPs in many states are merged with the Animal Husbandry programmes and no funds are allocated separately to ICDPs.

2.3. Operation Flood

The foundation for a viable modern and self-sustaining dairy industry based on cooperative concepts was laid in 1970 in the form of Operation Flood. The Government of India set up the Indian Dairy Corporation to handle the commercial transactions under the title "INDIAN WFP PROJECTS 618". The National Dairy Development Board (NDDB) implemented this biggest dairy development project in the world in three Phases, and in fact it has made a tremendous impact on the dairy development scenario in the country.

2.3.1. Phase I (1970 to 1981)

The basic objectives under this phase were to increase the capacity and throughput of dairy processing facilities, resettlement of city cattle in rural areas, development of basic transportation and storage network to facilitate regional and seasonal balancing of milk supply and demand, development of milk procurement systems in rural areas, to improve the productivity of animals, to assure the rural milk producers of a year round stable milk market and to establish 14 milch animal centres.

Under this project, WFP donated 0.126 m MT of Skim Milk Powder and 42,000 MT of Butter Oil. Through sale of these commodities, funds to the tune of ₹ 1164 million were generated and were utilized for creating infrastructure facilities necessary for dairy development.

The major achievements in the first phase were increase in milk production from 21 m. tons in 1970 to 30 m. tons in 1979-80, reaching the target of 2.9 Million litres per day in processing of milk for supply to the four metropolis, establishment of dairy cooperatives in 18 major milk shed areas and establishment of 14 milch animal centres and the Institute of Rural Management at Anand (IRMA).

2.3.2. Phase II (1981 to 1985)

The objectives were to enable 10 million rural milk producer families to build a viable self-sustaining dairy industry by mid 1985, to enable the milk producers to rear a National Milch Herd of 14 million crossbred cows and upgraded buffaloes during 1980s and to establish a National Milch Grid which would link the rural milch sheds to the major demand centres with urban population of about 150 million.

Some of the notable achievements were generation of funds amounting to ₹ 2323 million through sale of gift commodities up to November, 1984, expansion of handling capacities of four metro dairies from 3.1 million litres per day to 3.5 million litres per day by the end of October, 1984, increase in the number of village cooperatives to 43,000 covering 4.25 million milch producers, substantial increase in the production of milch powder, putting 622 road and 87 rail milch tankers into service under National Milch Grid and establishment of godowns with a capacity of 3000 tons to store dairy commodities.

2.3.3. Phase III (1985 TO 1996)

The gains obtained in the earlier phases were further consolidated in Phase III. Some of the significant achievements of Operation Flood were:

- i. Increase in the production of milk leading to a rise in the per capita availability of milk to 193 grams per day in 1994 from 107 grams in 1975.
- ii. Supply of milk to about 300 million consumers spread in 550 cities and towns at a reasonable price.
- iii. Procuring milk daily from 10 million producers spread in 74,000 villages and earning an incremental income of about ₹ 25.00 billion from sale of milk.
- iv. Establishment of a nationwide network of multi-tier milk producers cooperative societies.
- v. Modernization and expansion of dairy industry.
- vi. Self-sufficiency in milk and milk products thus putting an end to commercial imports of milk solids.
- vii. Indigenous production of dairy equipments.

2.3.4. Dairy Cooperatives

Efforts to develop dairying through rural organizations were made as early as in 1917 when the first milk cooperative society was formed in Bengal, to supply milk to the city of Calcutta, followed by United provinces, Gujarat and Madras states. The Government of Bombay had initiated subsidized milk distribution system in

1943, which was later closed in 1947 after expending over ₹ 3.0 million on it. In the year 1945, the Government of India decided to take measures to safeguard the supply of hygienic milk to major cities. A novel beginning was made in Bombay and for the first time in India, milk produced in rural areas of Kaira district was collected in bulk, pasteurized and then transported by rail for distribution in Bombay. The Kaira District Milk Producers' Cooperative thus started with an initial collection of 250 litres which is a landmark in itself in the history of cooperative movement in the country and is now more popularly known as AMUL (Anand Milk Union Limited).

The milk cooperatives under OF follow what is more commonly known as Anand pattern, which is nothing but a three-tier system of cooperative organization. At the village level there are Primary Milk Producers' Cooperative Societies, which collect, test and supply milk to the Milk Producers Union at District level and these Unions process and market milk and milk products. The Unions are also responsible for milk enhancement programmes through supply of technical inputs and services to the milk producers in the villages. The Unions are amalgamated into Milk Producers' Federation at State level. At national level there is a National Cooperative Dairy Federation (National Cooperative Dairy Federation of India). The entire co-operative organization is managed by representatives, elected by the milk producers from among the producers who are in fact the employers of this organization. The role of the government is to supervise, guide, encourage and where necessary to correct the cooperatives when something goes wrong.

The milk production got an incentive through what is called "market push" with the creation of viable milk marketing facility even in the remote corners of the country. There are arguments and counter arguments about the extent of contribution by OF in increasing milk production and per capita availability of milk in the country. Nevertheless, the cooperative societies did provide the needed thrust to the milk production in the country. There are indications that the dairy cooperatives contributed to improved education of children, employment, and income and infrastructure development in the villages (Candler and Kumar, 1998). It is well established that development is always a result of a number of factors and no single programme can stake its claim and OF being no exception to this.

The basic philosophy of the Anand Pattern is "to combine India's greatest asset, the power of its people, with professional management in a vertically integrated cooperative structure that establishes a direct linkage between those who produce milk and those who consume it, whether as milk or milk products, eliminating all the middlemen." (NDDB, 1997 - From a drop to a flood). However, elimination of middlemen from the system remains a myth till today.

2.3.5 Technology Mission on Dairy Development

To accelerate the phase of Dairy Development in the country, the Government of India launched Technology Mission on Dairy Development in August 1988. The Mission assigned 29 need-based research programmes to research institutes under the aegis of ICAR, State Agricultural Universities and NDDB.

2.4. Gaushalas

Gaushalas are the institutions to maintain the cattle, which are either donated by the people or thrown out by the farmers. These institutions are maintained basically to protect the cows and are in existence for the last two centuries. They are being maintained in different parts of the country on account of religious and economic considerations. However, they are mostly located in north India.

The Council of Gosamvardhana was established in 1952 to act as the central coordinating and advisory body on cattle development and to undertake detailed countrywide survey to assess the resources of gaushalas and to evolve a suitable scheme for their development. The survey indicated that there are 1020 gaushalas with, a cattle population of 130,000 spread in 21 States of the country. Each gaushala land on an average has about 151 acres of area under grazing and 63 acres of cultivable land.

With the establishment of Central Council of Gosamvardhana, the gaushalas were reorganised. The gaushalas did not receive much attention from the Government because the impact made by these institutions on cattle development and milk production was not considered significant. However, remarkable progress was made by gaushalas located at Nasik, Urtikanchan, Amritsar, Indore and Ahmednagar. Many of the gaushalas though maintaining some pure bred cattle are implementing cross breeding programme to increase milk production.

To exploit the production potential of the cows maintained in these gaushalas, the government has decided to hand over some of these gaushalas to semi government and Non Government Organizations (NGOs). The gaushala at Urlikanchan is being managed by Bharatiya Agro Industries and Research Foundation (BAIF). Similarly, the gaushala at Ahmednagar is under the control of NDDB. The cows in such gaushalas are being utilized as experimental herds for implementing various breed improvement and livestock management programmes.

In accordance with the agreement entered upon by the Chairman, NDDB and the Trustees of the Sabarmati Ashram Gaushala in July, 1973 the NDDB was entrusted with the responsibility for management of the Embryo Transfer Technology project for 20 years. All the project's assets were accordingly put into the hands of the NDDB. The major objectives of this project are: the maintenance and enhancement of productivity of agricultural farms and milch animals, carrying out research and development in the fields of agriculture and animal husbandry, disseminating the knowledge gained in these fields and establishing educational institutions for the integrated development of agriculture and animal husbandry, as well as to develop the necessary man power required to fulfill these broad objectives.

The NDDB has established a modern embryo transfer technology laboratory in this gaushala with the purpose of creating nuclear germ plasm pool to supply future bulls to AI centres for production improvement in cattle and buffaloes.

2.5 Special Livestock Breeding Programme (SLBP)

Based on the recommendations of National Commission on Agriculture (NCA), (1976), Special Livestock Production Programme was launched in 1975-76. The main objectives of the programme are:

- I. To provide employment opportunities to the weaker sections of the rural poor and to supplement their income.
- II. To increase the production of livestock products like milk, eggs, wool etc.

The programme includes crossbred heifer rearing scheme and setting up of sheep, poultry and piggery production units. The expenditure on SLPP was to be shared on 50 : 50 basis between Central and State Governments and 100% by Central Government in Union Territories. Thirty percent of the beneficiaries selected under the programme were to come from SC/ST communities. For setting up of sheep, poultry and piggery units subsidy was provided at the rate of 25 per cent to small farmers and 33.3% percent to marginal farmers and agricultural labourers and 50% in case of tribal beneficiaries.

The scheme also aimed at assisting the landless agricultural labourers, marginal and small farmers in improving the quality of crossbred heifer calves. The female calves in the age group of 4 to 10 months were included in the scheme. Balanced calf feed was supplied as subsidy to the owners of these selected calves up to 32 months or till the age at first calving whichever was earlier. The calves included in the scheme were also insured by the Department of Animal Husbandry. The purpose of supplying calf feed to reduce the age at first calving was defeated in many cases because the calf feed was offered by the beneficiaries to their cows for milk production rather than to their calves. In some cases the calf feed was being sold by the beneficiaries to the other cattle owners.

2.6. Integrated Rural Development Programme

The Integrated Rural Development Programme (IRDP) was launched in 1978-79 in 2300 Development Blocks which were earlier covered by special development programmes like Small Farmers' Development Agency (SFDA), Drought Prone Area Programme (DPAP), Command Area Development (CAD) etc. as a part of the new 20 point programme. It was extended to all the development blocks in the country with effect from 2nd October 1980, which coincides with the birth anniversary of Mahatma Gandhi.

The main objective was to raise families below poverty line (families of about 5 persons with an annual income below ₹ 24,000 in 2002) by creation of sustainable opportunities for self employment in the rural sector. The programme was implemented in all the blocks of the country as centrally sponsored scheme funded on 50: 50 basis by the Centre and the States.

The target group under this project consists of poorest among the poor including small and marginal farmers, agricultural labourers, rural artisans and craftsmen, scheduled castes and scheduled tribes and all persons who live below the poverty line. Livestock Production forms an important component of IRDP.

Organization:

The power to sanction schemes under IRDP has been delegated to the State Governments. The State level coordination committee approves the block level plans. The District Rural Development Agency (DRDA) a society registered under the Societies Registration Act, 1860, is the implementing organ in the district. The governing body of DRDA includes local MPs, MLAs, Chairmen of Zilla Parishads, and Heads of development departments in the district and representatives of SCs / STs and women.

Achievements:

Except in the initial years of establishment, achievements under IRDP always exceeded the physical targets throughout. This programme was evaluated by a number of expert committees and in fact it came in for sharp criticism especially on the wrong identification of beneficiaries and malpractices in handling the funds allocated for various schemes.

An expert committee on IRDP set up by the Reserve Bank of India in 1993 recommended: (i) switch over from front end to back end of subsidy, (ii) strengthening of the democratic character of IRDP through the involvement of Panchayats, (iii) setting up of district level technical groups for identification of investment opportunities, and (iv) preparation of project profiles, extension of cash disbursement of schemes throughout the country. These recommendations are accepted by the Government and are being implemented.

The Government has taken several measures to strengthen the Project. It has raised the target level investment per family from ₹ 12,000 in 1994-95 to ₹ 14,000 - ₹ 15,000 in 1995-96. The family credit plan is extended to all the districts in the country and the norms are revised to develop infrastructure base.

2.6.1 Training of Rural Youth for Self Employment (TRYSEM)

TRYSEM was launched as a centrally sponsored scheme on the 15th of August 1979. The objective was to train the rural youth in the age group of 18 - 35 years in acquiring necessary skills and technology to take up self-employment in agriculture and allied activities including animal husbandry, industry, services and business. Another scheme to strengthen the infrastructure facilities in the training institutions was also introduced with central assistance. Emphasis was also laid on systematic marketing as well as exploring possibility of setting up groups for the manufacture/assembly of non-traditional items for which there is good demand. The beneficiaries of TRYSEM are assisted by IRDP after the training is completed.

This scheme helped not only in improving the skills of a large number of youth but also in their self-employment. A major chunk of the beneficiaries belonged to SC/ST and women as per the provisions of the scheme.

2.6.2 Swarna Jayanti Gram Swarozgar Yojana (SGSY) :

This programme was launched on 1st April, 1999 and was formed by merging the earlier self-employment and allied programmes which include IRDP, TRYSEM, DWCRA etc. The programme taking into consideration strengths and weaknesses of all these self-employment programmes aimed at establishing a large number of micro enterprises in the rural areas. Persons assisted under this programme are known as swarozgaris and not beneficiaries. It was targeted to bring all the selected families above poverty line within a span of three years.

It includes all aspects of self-employment which includes organisation of rural poor into self-help groups and their capacity-building, planning activity clusters, infrastructure build-up, technology, credit and marketing. It emphasizes on formulation of activity clusters based on the resources of the people and their occupational skills in addition to availability of markets. The SGSY which is a credit-cum-subsidy scheme is being implemented by the DRDA through the Panchayat Samitis. The banks, NGOs and technical institutes in the district are being involved in planning, implementation and monitoring of the programme. A total of 289 thousand self-help groups were formed and 931 thousand benefitted by this programme by the year 1999-2000 and an expenditure of ₹ 9.55 billion was incurred.

2.6.3 Employment Assurance Scheme (EAS)

Unemployment as well as underemployment undermines the skills and its effect is more perceptible in rural areas. Providing additional employment opportunities in rural areas invariably is an in-built component of all the rural development programmes. The Government of India has taken up various employment generation schemes to alleviate poverty in rural areas. These schemes include Rural manpower programme, Crash scheme

for Rural Employment, Pilot Intensive Rural Employment programme, Food-for-Work Programme, National Rural Employment Programme (NREP) and Rural Landless Employment Guarantee Programme (RLEGP). In April 1989 the two on-going employment programmes RLEGP and NREP were merged into a single rural employment programme and was named as Jawahar Rozgar Yojana which was later restructured and streamlined and renamed as Jawahar Gram Samridhi Yojana (JGSY). This programme was launched on 1 April, 1999 with a two-fold objective of creating village infrastructure including durable assets and generation of supplementary employment for the unemployed poor in the rural areas.

Funds are allocated to the States on the basis of incidence of poverty. Within the States the allocation is done on the basis of SC/ST rural population. The village panchayats are empowered to choose the work on the basis of felt needs of the people. However, preference is given for economically productive assets. DRDA/ Zilla Parishads will release the funds to village panchayats for implementation of the projects at village level.

2.6.4 Employment Assurance Scheme (EAS)

This scheme came into operation on 2nd October, 1993 and is being implemented in all the rural blocks of the country. The main objective of the scheme is to provide assured employment of 100 days of unskilled manual work to the rural poor who are in need of it. The scheme is open to all men and women in the age group of 18-60 years in rural areas. The expenditure under this scheme is shared by Centre and States in the proportion of 75 : 25. The central assistance is released directly to the DRDA or Zilla Parishad and the District Collector or the Deputy Commissioner is the implementing authority of the scheme.

2.6.5 Drought Prone Area Programme (DPAP)

The Drought Prone Area Programme was started in 1973 with a view to minimize the adverse effects of drought on production of crops and livestock and productivity of land, water and human resources through integrated development of the natural resources. The other objectives include conservation and development of natural resources and ultimately to improve the socio-economic condition of the resource poor and disadvantaged sections of the society.

The programme is under implementation in 946 blocks of 149 districts in 13 States. The funds of this programme are shared by the Centre and the concerned State on 50 : 50 basis.

2.6.6 Desert Development Programme :

The Desert Development Programme (DDP) was started in the year 1977-78 in the hot deserts of Rajasthan, Gujarat and Haryana, and the cold deserts of Jammu & Kashmir and Himachal Pradesh. It aims at capacity-building and empowerment of village community. Since 1995-96, a new approach was adopted based on watershed development and under this programme a large area of land was brought under afforestation and pasture development.

2.6.7 The Integrated Wastelands Development Programme (IWDP):

The programme was started in the year 1989-90. This is being implemented from 1st April 1995 onwards on watershed basis under Watershed Development. The Scheme is being implemented through ICAR, State Agricultural Universities (SAUs), Government and private institutions having adequate infrastructure facilities. This project is being implemented in 25 States of India covering an area of 296 thousand hectares by May, 2000.

2.6.8 Technology Development, Extension and Training Scheme (TDET)

This scheme was launched in 1993-94 to develop suitable technologies for the reclamation of wastelands for sustained production of food, fuel-wood, fodder etc. It is being implemented by ICAR, SAUs, DRDAs and Government institutions having adequate institutional framework and organizational back-up.

2.6.9 Council for Advancement of People's Action and Rural Technology (CAPART)

CAPART is a registered society and operating from September, 1986 with New Delhi as its Headquarters. It aims at encouraging, promoting and assisting voluntary action for enhancement of rural prosperity by providing financial assistance to voluntary organizations. It is formed by merging two autonomous bodies Peoples' Action for Development India (PADI) and Council for Advancement of Rural Technology (CART). The schemes covered by CAPART for rendering financial assistance include DWCRA, IRDP, organization

of beneficiaries of anti-poverty programme, Jawahar Rozgar Yojana and Advancement of Rural Technology Schemes.

CAPART has recently established nine regional committees at Ahmedabad, Bhubaneswar, Guwahati, Hyderabad, Jaipur, Patna, Chandigarh, Dharwad and Lucknow which are empowered to consider sanction and monitor projects up to an outlay of ₹ 1 million.

3. INDIAN COUNCIL OF AGRICULTURAL RESEARCH (ICAR)

The Indian Council of Agricultural Research is the apex body in India, which is entrusted with the responsibility of providing guidance and leadership in agricultural research, education and extension. The mandate includes promotion of transfer of technology programmes. A post of Deputy Director General (Agricultural Extension) is created at ICAR who is responsible for assessment, refinement and transfer of agricultural technologies, which includes crop, livestock and fisheries. The ICAR has promoted a number of transfer of technology projects viz. Krishi Vigyan Kendra (KVK), Trainers' Training Centers (TIC), Lab to Land Programmes (LLP), National Demonstration Projects (ND) and Institution Village Link Programmes (IVLP).

3.1 Krishi Vigyan Kendra (KVK)

The ICAR has established KVKs in the country in the year 1976-77 with an objective of imparting learning through work experience. It also aims at imparting training to extension workers who are already employed and to practising farmers and fishermen who wish to be self-employed.

The main characteristic feature of KVK is that there is non-uniform syllabus for the Kendras. Each Kendra has to prepare its syllabus and programmes in tune with the felt needs, natural resources and the potential for agricultural growth in that particular area. The responsibility of operating the KVKs is entrusted to

- i. Agricultural Universities and ICAR institutes;
- ii. Voluntary agencies with a good record of serving rural communities especially in backward, tribal and hilly areas;
- iii. Institutes of Science and Technology and
- iv. State Government agencies, in case the above organizations are not available.

Initially 18 KVKs were established with a budget of ₹ 1.0 million to each KVK. Later, efforts were made to establish KVK in each State and now it is contemplated to have one KVK in each district. At present there are 281 KVKs functioning in the country and almost all of them are primarily involved in promoting crop technologies. There are only two KVKs, which are catering to the requirements of livestock development in the country.

The mandate of KVK was also modified to suit to the changing situations. The mandate of KVK at present includes:

- i) On-farm testing, refining and documenting of technologies in collaboration with the researchers and extension personnel;
- ii) Organizing training for extension personnel to update their knowledge and skills in advances in agricultural research;
- iii) Organizing long-term vocational training courses for the rural youth with emphasis on 'learning by doing' for generating self-employment through institutional financing;
- iv) Organizing front-line demonstrations in various crops to generate production data and feedback information.

Extension activities include field days, farmers fairs, kisan 'goshties', agricultural exhibitions, clinical camps, and video film shows to update the knowledge of farmers on the latest technologies. About 0.2 million farmers are being trained every year by these KVKs in the areas of crop husbandry, horticulture, animal husbandry and dairying, fisheries and vocations leading to self-employment.

The KVKs are being monitored by eight Zonal Coordinating units established in different zones of the country. The impact of KVKs was assessed through change in the level of adoption and income.

3.2. Frontline Demonstrations (FLD)

“Seeing is believing” is the main principle behind the demonstrations. Earlier demonstrations were being organized in the research stations/farms, which came under criticism because the research farm situation cannot be compared to the farmer’s field. This criticism could be avoided by conducting demonstrations on farmers’ fields, which automatically provide opportunity for the researchers, extension personnel and the farmers to evaluate the technologies. With this intention the ICAR laid emphasis on front-line demonstrations with the following objectives:

- i. to demonstrate the newly released production technologies on the farmers’ fields;
- ii. to exploit their maximum potential in a given farming system;
- iii. to prepare technical leadership in the villages by imparting desired training; and
- iv. to organize the need-based training programmes for subject matter specialists and farmers, after identification of problems.

3.3. Trainers’ Training Centres (TTC)

The ICAR has established Trainers’ Training Centres in different parts of the country to provide specialized training to the teachers of the KVKs and also to those in-service teachers and staff who are involved in vocational agriculture in different institutions. The objectives of TTCs are:

- i. to impart training to the teachers of KVK in agricultural technology as well as in pedagogy;
- ii. to train teachers who are likely to be engaged in teaching in agriculture at high school level;
- iii. to train the trainers of Gramsevika/Gram Sewak Extension Training Centres of the region; and
- iv. to organize vocational training programs in agriculture technologies and home economics.

There are eight TTCs functioning in the country to provide technical support and update the skill of the staff of KVKs and subject-matter specialists in their areas of specialization as well as latest training methodology.

3.4. Institution Village Link Programme (IVLP)

Lack of functional linkages between research, extension and farmer systems is identified as one of the important reasons for low adoption of technologies. To create an effective linkage between these systems and to secure the participation of farmers in technology development and refinement, the ICAR has approved a novel programme “Technology Assessment and Refinement through Institution Village Linkage Programme” (IVLP) in 1995 with a budgetary provision of ₹ 101.6 million. This programme is being implemented through 42 centres of research institutes and SAUs covering 42,000 farm families.

The programme envisages creating a resource group of trainers for organizing training of core team of scientists for different centres. These scientists are used as resource persons in subsequent training programmes organized in different zones. The basic idea is to train the scientists in the concept, approaches and methodologies to be adopted in planning and execution of participatory technology development approaches envisaged in the project. Each centre then prepares a project document, which after thorough discussion in the zonal steering committees is approved for implementation.

3.5. National Agricultural Technology Project (NATP)

The NATP focuses on a decentralized approach for effective utilization of production systems including indigenous knowledge in augmenting productivity, profitability and sustainability. The important issues addressed by this project are: (i) national household food security, (ii) poverty alleviation and equity, (iii) environmental quality and conservation of bio-diversity, (iv) sustainability in the use of natural resources, (v) product diversification to enhance rural income, (vi) welfare of tribal people, women and other disadvantaged groups and (vii) exploitation of commercially viable technologies and enhancing export potential.

It is a comprehensive project with a budgetary support of US \$ 240 million being implemented through a number of agencies. Under the innovations in technology dissemination, 53 zonal research stations are remanded to function as KVKs. These stations are being strengthened to serve their new role of developing and testing location-specific technologies. Forty Agricultural Technology Information Centres have been established for providing single window support system linking various units of research institutions in ICAR

and SAUs. Some of the Directorates in SAUs are being strengthened in addition to establishing Agricultural Technology Management Agencies in some of the districts. The State Agriculture Management and Extension Training Institutes are also being strengthened to train farmers and extension workers.

3.6. Gender Issues

Gender issues pertain to the socially and culturally created differences between women and men. It is a misconception that gender issues reflect only the involvement of women rather than both men and women. To gain deeper insight into the gender issues one needs to study division of labour, access and control over inputs and outputs of the farm and their role in decision-making. These issues attracted the attention of researchers with the pioneering work of Feldstein and Poats (1989) who gave a methodology to study the involvement of women / men including children in farming operations, accessibility to resources and their role in decision making on issues related to farming.

The involvement of farm women in rearing livestock needs no emphasis. Studies conducted on their participation in farming activities clearly revealed that on an average a farm woman spent about 3 to 5 hours a day on livestock rearing. The participation of farm women was complete in activities such as cleaning of animals and sheds, watering, milking, disposal of milk etc. The extent of their participation however, varies depending upon their locale and also on the type of activities which include collection and claffing of fodder, feeding of animals, grazing, taking animals to veterinary dispensary etc. (Dhaka et al, 1993). However, the resources are not accessible to the women and mostly men are involved in decision-making aspects in the issues related to farming. They also observed that the farm women played a dominant and supportive role in decision-making on various activities of dairy farming.

The major issues concerned with the gender are :

1. When the participation of women in livestock rearing activities is quite substantial, whether training men in these activities serves any useful purpose;
2. How to encourage the participation of farm women especially in off-campus training programmes when the number of women extension workers is very meager;
3. Whether it is advisable to encourage farm women to adopt technologies which generally do not help them in reducing their drudgery; and
4. How to help women to reduce drudgery in farming operations such as transplanting of paddy, making of dung cakes, collection of grasses, fetching drinking water etc.

3.6.1. National Research Centre for Women in Agriculture (NRCWA)

Realizing the role of women in agriculture and allied activities the ICAR has established a National Research Centre for Women in Agriculture (NRCWA) in 1996. The Objectives of this Centre are:

- i. Acting as a repository of information relevant to women in agriculture,
- ii. Strengthening the use of gender analysis in research and technology development to ensure that women's as well as men's agricultural enterprises and operations are fully considered for defining research programmes and setting priorities,
- iii. Collaborating in women's specific research, education and technology assessment and refinement with relevant national and international organizations,
- iv. Conducting training and developing training modules and manuals for sensitizing gender-related issues in research/ programme/policy developments,
- v. Developing and testing women - specific models and manuals for technology transfer,
- vi. Providing leadership and sponsor training programmes to strengthen the knowledge and skill related to gender implications in 'Farming Systems Research approach' for the researchers and extension professionals engaged in the role of women in agriculture, and
- vii. Providing consultancy services within and outside the country on Women-Specific research /projects /programmes.

3.6.2. Development of Women and Children in Rural Areas (DWCRA)

This programme envisages formation of groups of 10 - 15 rural women and each group was involved in carrying out income-generating activities. Each group was given a revolving fund of ₹ 15,000 which was shared equally by the Centre, State and UNICEF. This fund was later enhanced to ₹ 25,000 and the UNICEF also bore the expenditure on the staff salaries for a period of six years, which is fully reimbursed.

4. MODELS OF TECHNOLOGY TRANSFER

The Food and Agriculture organization (FAO) identified nine major extension approaches in the world. These approaches are: (i) the general agricultural extension approach, (ii) the commodity specialized approach, (iii) the training and visit approach, (iv) the agricultural extension participatory approach, (v) the project approach, (vi) the farming systems development approach, (vii) the cost sharing approach, and (viii) the educational institution approach. Although these models are evolved over a period of time in different countries to secure adoption of technologies by the farmers, there is no single model, which is superior to others in all the situations. However, it is necessary to understand the characteristics of some of these models, which have been tried in animal husbandry.

4.1 Research - Extension - Farmer (Top Down Approach)

The basic assumptions of this model are:

- The researcher knows what farmer needs;
- The farmer can be benefitted by adopting the technologies;
- The farmer(s) who failed to adopt technologies are considered as laggards;
- Technologies are considered as scale-free and suitable to all categories of farmers;
- The reasons for non-adoption are taken as failure on the part of extension or ignorance on the part of the farmer and never because of the limitations in the technology;
- Superior technologies do not require extension support; and
- Technologies if once adopted by the progressive farmers and/or resource-rich farmers, get automatically diffused in the villages.

Based on this model efforts were made to establish research organizations and lots of funds were infused in generating and transferring technologies in addition to the supply of technical inputs and services. Although this model helped in evolving various technologies, the fact remains that very few farmers (mostly progressive) benefitted from the use of these technologies. A large number of technologies remained confined to the libraries and never reached the farmers' fields for a variety of reasons.

Adoption of technologies depend upon multiplicity of factors which include knowledge and skill of farmers, their attitude towards the technology and accessibility to inputs and services necessary for adoption in addition to the characteristics of the technology. For instance to adopt artificial insemination-in cows the cattle owners must know the symptoms of the cow in heat (knowledge), possess the skill in identifying the cow in heat (skill), be favourably disposed towards the artificial insemination (attitude) in addition to the accessibility of semen, A.I. Equipments (technical inputs) and the inseminator (technical services).

Kessaba (1989) indicated lack of accessibility to resources and other services, piece-meal approach in solving the problems of small farmers without giving consideration to their complex situation and failure on the part of the research institutions to develop viable options which are consistent with their needs and resources as the reasons for poor adoption of technologies of small farmers.

Experience with this model showed that:

- Many technologies developed are either rejected or discontinued by majority of livestock owners;
- The percentage of adoption in most of the cases is very low;
- The technologies in fact helped in increasing the gap between the rich and the poor;
- The researcher is not in a mood to accept that the technology needs refinement and livestock owner has a role to play in technology development; and
- The technology developed failed to address the felt needs of the livestock owners.

The cross-breeding of cattle was developed by the researchers not because the cattle owners demanded it but because they (researchers) consider it necessary to increase milk production at a faster pace. This technology is being implemented in almost all parts of the country with varying degrees of success. Lot of resources are being pumped in, to increase the adoption of cross-breeding programme through various incentives which include free AI, calf subsidy scheme, subsidized feed ration, cash incentives for high-yielding cows, free FMD vaccination for crossbreds etc. Although the contribution of Cross Breeding Programme to the increase in milk production in India is yet to be established, it has resulted in many negative consequences (Rao et al 1994.) This is an example for technology-push system of transfer of technology, which followed top-down approach of Extension.

4.2. Conventional Agricultural Extension Approach

This model is akin to the traditional transfer technology model, which is pursued vigorously by various agencies in India to increase animal production. It is assumed that increase in the production by the livestock owners results in their improvement of socio-economic status and in addition it also helps in increasing the national production. The clientele in this approach are the livestock owners including landless agricultural labourers who rear animals.

The cattle development schemes like KVS and ICDP implemented in different States adopted this traditional approach of transferring technologies to all categories of livestock owners in the key village blocks and project areas. The extension approach is to educate the livestock owners on various aspects of animal health, breeding and management of animals especially cattle and buffaloes in addition to the free supply of technical inputs such as semen, fodder seeds and services to perform AI, treatment of animals, deworming, dehorning, vaccinations etc. The Livestock Assistant and the Veterinary Assistant Surgeon are considered as the grass-root livestock extension agents who utilize their contacts with the livestock owners either at the veterinary centre or at their farms for transfer of information. The approach is to secure adoption of technologies initially by the progressive livestock owners who later show the way to other groups of livestock owners.

This approach helped rich livestock owners better than poor livestock owners for a variety of the following reasons:

1. It is easy to achieve targets say on number of inseminations performed, vaccinations done, management practices adopted by the livestock owners by targeting the creamy layer of the society which owns large herds compared to landless livestock owners with very small and that too scattered herds. Hence, the focus is on the resource-rich farmers who own number of livestock rather than poor livestock owners who possess fewer animals.

- ii. The resource-rich farmers being influential in the area, the extension agents would like to favour them by rendering advice on scientific management of livestock as well as supply of technical inputs and services in return for better hospitality for themselves and their superiors.

- iii. The extension agents have to depend upon the village leaders while organizing various extension programmes in the villages. It is very difficult to organize such programmes without the cooperation of these village leaders who are mostly resource-rich farmers.

- iv. The poor livestock owners often do not have the time to visit the veterinary institution nor have the resources to utilize the services of the VAS or the livestock assistants at their doorsteps. As a result, their contact with extension agencies is very poor. This explains to a great extent the reason for the low awareness of extension programmes by the poor livestock owners.

- v. The animals owned by the resource-poor farmers are usually not well maintained due to paucity of resources and hence difficult to demonstrate the impact of high input technologies on the economy of these livestock owners.

4.3. Animal Husbandry Extension Programmes of the Universities and Research Organizations

Many research institutions under the ICAR and SAUs adopted few nearby villages basically to test, modify and refine the technologies and later to release such proven technologies for wider applications. These institutions followed the typical top-down approach or the traditional model of transfer of technology.

The SAUs established Directorates of Extension, which are entrusted with the responsibility of processing, conducting field trials and disseminating the agricultural technologies, which include animal husbandry. However, the emphasis is more on crop technologies. The establishment of Animal Husbandry Extension Department is of very recent origin and in many of the 35 veterinary colleges in the country these departments are yet to be established. However, the ICAR institutes especially, NDRI and IVRI, are pursuing extension activities mainly through village adoption, that too in the villages around the Institutes.

The approach is to adopt a cluster of villages and to establish stockman centers, which serve as focal points to transfer the technologies evolved by the institutes. These villages serve as field laboratories for the institutes, which have established departments of extension. The activities focus around offering advice through farm and home visits, group discussions, distribution of publications on various aspects of livestock production, conducting on-farm trials and supply of technical inputs and services entirely free of cost. Organization of dairy melas or livestock shows, and exhibitions in addition to organizing various competitions is a routine feature of these organizations to encourage livestock owners to adopt scientific way of managing animals to increase their production.

All the livestock owners in the adopted villages are the clientele for the extension programmes. The extension agents include field level livestock assistants and veterinarians in addition to the scientists and technicians working in the institutes, which are associated with the development and transfer of technologies. The involvement of farmers is only at the stage of adoption of technologies on their farms.

This approach did help in increasing the adoption of technologies but in a very limited area and that too few fortunate farmers who had access to the institutes and to the field extension agents in the villages. The major weakness is that the development cannot be sustained in the event of withdrawing the institutional support to these villages and as a result the institutions are finding it difficult either to extend it to new villages or withdraw from the existing villages. In addition it is also not possible to replicate the programme elsewhere mainly because the system developed is specific to the Institute concerned.

4.4. Commodity Approach

In this approach the main focus is on production, processing and marketing of a single commodity. For example Operation Flood which is totally involved in collection, processing and marketing of one commodity "milk and milk products" initially (later diversified into vegetable oil, fruits and vegetables). The clientele are the members of the producers cooperative societies established in the villages and consumers of milk and milk products in urban areas. The extension agents are the veterinarians, the secretaries of the cooperative societies and staff especially of procurement wing of the milk unions.

The aim is around development of the milk producers through increased milk production. The approach is to establish milk producers' cooperative societies in the villages which serve as nodal centres for collection and testing of milk as well as for supply of technical inputs which include concentrates, fodder seeds, veterinary medicines and technical services such as AI, vaccinations and treatment of animals in a more efficient and effective way. The transfer of technology activities revolve around training of farmers, organizing conducted tours, group discussions, meetings and providing inputs and technical services to the members.

The major advantage of this system is that it provides market push through providing remunerative and regular market for milk in the villages. The emphasis is also on the development of leadership and improving decision-making skills of the milk producers. This system helped in transfer of dairy husbandry technologies to a great extent and research clearly revealed that the knowledge and adoption of technologies by members of the cooperative societies are significantly higher than those of non-members. In addition, it has also helped in ushering in social equality among its members who have equal rights irrespective of their caste, creed or economic status and the quantum of milk supplied to the society. OF in fact has revolutionized the production, processing and marketing of milk in the country.

This approach is also not successful in all the villages in the country. Many of the societies which are incurring losses are not in a position to provide the technical inputs and services to the member producers and as a result they were caught in a vicious circle and finally turned out to be defunct societies. The success or failure of these societies depends to a great extent on the participation of the members in the activities of the societies as well as the abilities of the presidents and secretaries in management of the societies. With the adoption of economic liberalization policy by the Government of India there is a spurt in the number

of private dairies in the country and as a sequel the dairies in the co-operative sector are facing stiff competition with them.

4.5. Integrated Approach

The basic aim of this approach is to bring about around development of the weaker sections of the society through the adoption of livestock production technologies. The concept that land ownership is not a necessary condition to rear animals and the socio-economic condition of the landless agricultural labourers could be improved through livestock rearing is the main assumption underlying this scheme. Livestock rearing is identified as one of the important sectors for solving unemployment problem in the rural areas. Projects like Special Livestock Production Programmes, Training of Youth for Self Employment (TRYSEM) and Development of Women and Children in Rural Areas (DWCRA) are the best examples of this integrated approach. All these projects have a component of livestock development.

Under these schemes milch animals or lambs or kids or piglets or chicks are distributed to the beneficiaries for rearing them and earning income through sale of their produce or the animals. Many organizations like Banks, Departments of Animal Husbandry, insurance companies, development departments, milk unions etc, are involved in implementing these schemes. The objective is to create productive assets and to generate employment opportunities in the rural areas and ultimately to bring them above poverty line.

The idea behind these schemes though it appeared theoretically sound, failed to deliver goods mainly because of the wrong selection of beneficiaries and misappropriation of funds. The net result is that these schemes instead of helping the resource-poor people to improve their incomes, in fact made them reel under debts.

Efforts were also made to transfer agriculture technology through 'Training and Visit' system but this model also did not escape from the usual criticism of helping only resource-rich farmers. However, this model was never employed to transfer livestock production technologies, perhaps due to lack of an organized animal husbandry extension organization. The policy reforms suggested a shift from the "single discipline based and commodity-oriented approach" of T & V system to the 'farming systems approach'.

4.6. District Level Agriculture Technology Management Agency (ATMA) Model :

The key concept in this model is to decentralize the decision-making to the district level through the creation of the ATMA as a registered society. The aim is to increase farmer input into programme planning and resource allocation, especially at the block level and to increase accountability to stakeholders. In addition it is also contemplated to increase programme coordination and integration between departments so that the following programme thrusts can be more effectively and efficiently implemented (Sadamate, 2001) :

- Farming systems innovations especially the intensification and / or diversification into high value commodities and / or value-added marketing and processing activities;
- Farmers' organizations especially for high-value commodities and resource-poor farmers;
- Technology gaps in both crop and livestock production systems; and
- Natural resource management especially soil and water management and to reduce pesticide use through integrated pest management programmes.

This model envisages creation of a more bottom-up extension system of Participatory Rural Appraisal procedures across all system levels (district, block, mandal and village) and across each participating line department including Animal Husbandry. This approach is being implemented in the different States of the country.

All these attempts to develop and use various models of transfer of technologies clearly revealed that no model is superior to the other and can be a substitute for others. On the performance of agricultural extension systems, Martin (1989) lamented that "Despite the considerable effort put into a large number of experiments in different countries including some recent ones based on the so called 'training and visit' system, the effort to transfer technology to small farmers has not been satisfactory."

5. EVOLUTION OF TECHNOLOGY TRANSFER :

The process of technology has passed through many phases. Initially it was attempted to transfer the technology directly from the developed countries to India.

5.1. Direct Transfer of Technology:

The transfer of technology was recognized as important for agricultural development, which includes the development of livestock and poultry. Failure to make use of the available technology is considered as one of the reasons for developing countries lagging behind in agricultural development.

Hayami and Ruttan (1991) indicated three distinct phases of international technology transfer viz. (i) Material transfer (ii) Design transfer and (iii) Capacity transfer.

Material transfer: In this phase, material is directly transferred from developed to developing countries. During 1960 and 70s to increase milk production in the country, India imported exotic breeds of cattle which include Jersey, Brown Swiss, Holstein Friesian, Guernsey etc. Similarly, exotic breeds of goats, sheep, pigs, poultry were also imported directly from various countries. The performance of these exotic breeds of livestock was not satisfactory owing to their adaptability to local conditions.

Design transfer: The transfer of exotic breeds to India is mainly encouraged for the production of crossbreeds by mating with the local cows. Projects such as Red Dane project in Bangalore; Indo-Swiss cattle projects in Punjab, Andhra Pradesh and Kerala; Bharatiya Agro-industries Research and Development Foundation (BAIF) in Maharashtra and Gujarat were established primarily for production of crossbred cattle to suit to the respective regions. Similar experiments were conducted with sheep, goat, pig and poultry breeds. The objective was to develop disease-resistant breeds of animals with increased production potential under local conditions. As a result of experimentation, a number of new breeds/varieties were evolved and multiplied after testing them for their performance. In this "crossbreeding phase", efforts were made to develop crossbreeds in almost all the species of animals in the research institutions/stations and to transfer these to the livestock owners either through direct supply of animals or indirectly through artificial insemination of the farmers' animals with exotic semen.

Capacity transfer: The technology is transferred through transfer of technical know-how and the capacity which enables the production of location-specific technologies. By using the technique of AI, crossbreeding technology is diffused into the villages to develop locally adaptable animals, which are supposed to be superior in production to local cattle. The steps in the crossbreeding programme include:

1. Import of pure breeds;
2. Experimentation on performance of pure breeds;
3. Import of exotic bull semen;
4. Import of exotic bulls;
5. Collection, processing and storage of semen;
6. AI technique;
7. Frozen semen technology;
8. Development of crossbreeds;
9. Experimentation and testing of crossbreeds; and
10. Diffusion of crossbreeding technology.

The entire process of technology transfer has led to the establishment of various institutions primarily to develop technologies to increase production of livestock and to solve the problems emerging out of the adoption of such technologies. Even the objectives of some of the institutes were redefined to address the emerging problems. Institutions are established to develop breeds, management practices to improve their production and to evolve methods to propagate these breeds in the farmers' herds.

5.2. Appropriate Technologies

With the realization that technologies developed are not suitable for all kinds of farmers spread in different agro-climatic regions, efforts were made to develop appropriate technologies to suit to the prevailing farmer situations. This gave rise to Regional Research Stations to develop appropriate technologies to suit to the farmers of that region. In the process many varieties or breeds of livestock were released along with a package of practices for use by the livestock owners in that locale. The ICAR in collaboration with State Agricultural Universities (SAUs) established All India Coordinated Research Projects and Zonal Research Stations for this very purpose of developing and testing technologies to suit to those regions.

The farmers were neither involved in technology development nor its testing even at the regional level when the researches are being conducted by the research stations. Whatever technologies were evolved and tested in a particular research station it was assumed to be suitable to the farmers of that region and efforts were made to transfer the technologies to the livestock owners. However the success of developing technologies appropriate to the livestock owners of that region is not well appreciated.

5.3. Farmer Participatory Research

Research, whether formal or informal and involving scientists or farmers will be considered to be a more or less deliberate and systematic process that proceeds through three general stages. (i) identification of opportunities (commonly referred to as problems or constraints), (ii) identification of ideas or options and (iii) testing and / or adaptation of the ideas and options.

The term 'Farmer Participatory Research' is often used synonymously with Participatory Technology Development, Agricultural Technology Development and Appropriate technology (Okali et al, 1994).

Different terminologies are being introduced all of them centred around farmers. These include Farmer-back - to - Farmer (Rhoades and Booth; 1982)/ Farmer-first - and- last (Chambers and Ghildyal, 1985) and Beyond-Farmer-First (Scoons and Thompsoh,1992).

It is now increasingly realized that livestock owner/ the ultimate user of the technologies as well as the decision-maker of the technology-adoption in his farm must be involved in all the stages of the technology development, testing and adoption. This participatory extension approach is based on an equal partnership between farmers, researchers and extension agents who can learn from each other and contribute their knowledge and skills. This thinking emanated mainly because of the following reasons:

- i. The livestock owners know about their situation better than the researcher as well as the extension agent;
- ii. The livestock owners have evolved a number of time-tested practices which are 'transferred' from generation to generation and 'are now recognized as Farmers' Wisdom, Indigenous Technical Knowledge etc;
- iii. The livestock owners have more experience with management of the animals than the researcher and extension agents in aspects other than health-related areas;
- iv. A farmer has to play different roles, which include agronomist, agricultural chemist, dairyman, poultry farmer, veterinary clinician etc. and hence he has more general view and ideas about animals than any researcher or extension agent;
- v. A farmer is more concerned with all aspects of farming, which include land, labour, capital and animals whereas, the extension agent is concerned either with increasing milk production (even at the cost of crop production) or only grain production depending upon his/her specialization;
- vi. Any technology not accepted by the farming community is considered as a waste. Maladjustment in the technologies is also recognized as one of the reasons for non-adoption;
- vii. A technology, which addresses farmers' problems is more likely to be adopted by them than otherwise;
- viii. The probability of developing useful technologies is more with the involvement of farmers in all stages of technology development and adoption;
- ix. Many agricultural innovations, if not most, are developed by farmers themselves and hence extension agents can often learn much from the farmers to educate other farmers (Roling, 1988); and
- x. Farmer but not the researcher or the extension agent decides whether or not to adopt a technology on his farm (Van den Ban & Hawkins, 1998).

5.4. Farmers' Experimentation

Although it is difficult for the researchers to accept farmers as partners in technology development, emphasis is being laid on the involvement of the farmer in 'On-farm' testing of technologies. The two basic principles underlying the concept of farmers' experimentation are "Seeing is believing" and "Learning by

doing.” This however, entails the researcher and the extension agent in training the farmer in conducting research especially observations of phenomena and measurement of variables. For example, it is very difficult to convince dairy farmers about the advantages of colostrum feeding to the newborn calves because this practice has a very poor observability of results. Instead, the researcher can train them to conduct trials on feeding of colostrum to the new born calves by experimenting with one group of calves fed on colostrum and the other without colostrum. This approach helps the cattle owners involved in experimentation better appreciate the differences in terms of growth, incidence of diseases, age at maturity etc. After the completion of experiment, if these cattle owners involved in this experimentation share their experiences with other cattle owners it will serve a useful purpose rather than trying to convince them to feed colostrum to the newborn calves. In the process the researcher and extension agent also get the benefit of such experimentations on farmers’ herds especially in terms of establishing credibility and building up rapport with cattle owners.

5.5. Farming Systems Research (FSR)

It is more and more recognized that the farm has to be treated as a system consisting of sub systems, which are interdependent on each other. This view is gaining momentum mainly because a farmer usually possesses a piece of land, few animals, family labour, some equipments /machinery and he has to utilize all these resources to produce food and non-food items required to meet his/her family requirements if not surplus to sell them out. In this system farmer is taken or considered as one of the important partners in technology development, evaluation and adoption. The steps of FSR clearly indicate the important position a farmer holds in this situation (Amir & Knipscheer, 1989; Raman & Balaguru, 1992; Collinson, 2000).

All these efforts are being made to understand farmer better than ever so that research can be geared to develop technologies useful to improve production.

6. ROLE OF EXTENSION AGENTS

All those who rear animals for production are considered as livestock owners. However, the objectives of rearing may differ from region to region and within the region from one livestock owner to the other. The basic premise in development is that extension must be client centred. A technology which is useful to one group of livestock owners say cattle keepers may not be useful to other cattle keepers. This is mainly because of variations in their socio-economic situation, goals or objectives of rearing animals and level of technology adoption and so on and so forth. The livestock owners could be classified under different categories.

1. On the basis of Species	2. On the basis of land	3. On the basis of location
Cattle/buffalo keepers	Landless farm workers	Tribal cattle owners
Sheep farmers	Marginal	Rural
Goat keepers	Small	Semi / peri urban
Pig keepers	Medium	Urban
Poultry farmers	Negligible	

The cattle keepers though in common rear only cattle or buffaloes are not homogenous because of variations in other characteristics. This heterogeneity on various aspects makes the job of extension more complicated. Landless dairy farmers in urban and rural areas differ very widely. Even in the rural areas there could be significant differences within the same class of cattle owners. Hence, identification of their needs poses a serious problem to ‘the extension agents. It is also impossible to develop technologies to suit to the individual cattle owners who are very many and that too with varied interests and resources. Added to this confusion are the objectives pursued by various actors of development which also conflict with each other putting the development in reverse gear (Rao, et al 1995). However, there are similarities among the livestock owners, which help in identifying homogeneous groups for problem identification and technology development. Zoning, transects and Rapid Rural Appraisal, Participatory Rapid Rural Appraisals are some of the methods used in this direction (Jain et al. 1995).

The extension agent is more often considered as an agent of transfer of technology. The Animal Husbandry extension agent has to perform certain activities bestowed on his post. The extent to which he is able to perform his role as an extension agent depends to a great extent not only on his abilities but also on the expectations mainly of his superiors and his clients, the livestock owners. At times the role expectations of

these two groups of actors of development conflict with each other, which pose serious problems to the extension agent. The probability for this conflict is high under the following conditions (Van den Ban & Hawkins, 1998):

- i. When the superiors expect the agent to implement programmes of increasing milk production through crossbreeding of cattle at a faster rate in areas where the farmers are more interested in development of buffaloes or indigenous cattle;
- ii. When farmers expect them to supply technical inputs and services rather than educating them on how to rear cattle for better production. This is especially true in a situation where the superiors had a misconception about the role of extension agent who is being utilized for performing mixed roles; and
- iii. When superiors consider supply of inputs and services is of paramount importance for adoption of technologies and education of farmers is secondary, the superiors expect the extension agents to supply the inputs and services.

In the Indian context the Veterinary Assistant Surgeons and the livestock assistants are the field level Animal Husbandry extension agents who are mainly responsible for diagnosis and treatment of diseases and performing AI in bovines. They are not clear about their role as extension agents. At no point of time these personnel were given an understanding about their role of educating the livestock owners. Extension, to many of them means supply of technical inputs and providing technical services. For this reason many a time in the reports of Animal Husbandry departments it could be noticed that the activities such as supply of fodder seeds, distribution of lambs, piglets, supply of cattle-feed etc. are included under the head extension activities. Targets are never fixed for the extension activities such as farmers meetings, demonstrations, calf rallies, exhibitions and group discussions. Morton et al (1997) reported that in India, there is currently no formal extension service and extension accounts for a very small proportion of DAH budgets.

The field veterinarians in Animal Husbandry department have a unique opportunity of interacting with the livestock owners either at the dispensary or at livestock owners' premises while attending to sick animals. They can exploit this contact in educating the livestock owners on various aspects of livestock rearing. They can develop a very good rapport with the livestock owners by successfully treating the animals, which help in building up their credibility as a potential source of information, which is of paramount importance in educating the livestock owners.

7. COMMUNICATION

Communication in short is defined as the process of passing on the information (message/idea) from the source (originator of the message) through a medium (channel) to the intended target (receiver) who in turn understands the message and passes on his/her intentions to the source (feedback). The extension personnel are to use communication effectively to accomplish their goal of transferring the information to the livestock owners and hence, communication is identified as an intervention in extension. The communication needs of livestock owners depend upon the species of animals they rear, their entrepreneurial characteristics which include their level of knowledge, objective of their farm, resource position, situation of the farm, infrastructure facilities and a score of other factors.

The poultry farmer who has just entered into the business is more concerned about the maintenance of the farm than a veteran commercial poultry farmer who is more interested in marketing information. In the area where, crossbreeding of cattle is recently introduced the cattle owners are more bothered to tackle problems related to calf-rearing, vaccination, sale of milk etc. On the other hand in the areas where crossbreeding is going on since many years the cattle owners are more concerned about the repeat-breeding, embryo transfer technology etc. Similarly, an urban dairy farmer is interested to know more about labour-saving technologies like machine-milking which has little relevance to most rural dairy farmers.

The type of problems the livestock owners face in an area depends upon various characteristics which include stage of development, infrastructure facilities such as veterinary institutions, market network, transportation available in the area, characteristics of farmers, and other factors. Accordingly, their communication behaviour also varies. Depending upon the characteristics, the farmers could be categorized into different combinations.

Farmer categorization:

Criteria		Categories		
Society	Rural	Semi-urban		Urban
Age	Young	Middle-aged		Old
Literacy	Illiterate	Primary school		High school
Knowledge	Low	Medium		High
Farming	Subsistence	Commercial	Mixed	Contract
Adoption	Innovators	Early majority	Late majority	Laggards

Likewise, a number of combinations of livestock owners could be obtained. It is useful to categorize livestock owners on some of the broad characteristics so as to group them into appropriate target categories, which help decide the communication needs.

The methods of communication are classified into individual, group and mass methods depending upon the number of audience or the receivers involved. Every method has got its own advantages and disadvantages and no method is apt to be recommended in all situations, as there is no single method, which is considered as panacea for all communication problems. The method to be selected depends upon the type of audience, availability and cost of methods, availability of infrastructure facilities like power, equipments and above all the purpose of the communication.

Individual method, say interpersonal communication, is very effective in discussing the repeat-breeding problems of a dairy farmer but it is of no use when a group action, say castration of village bull, is to be discussed. Group methods such as demonstrations are suitable to impart skills on clean milk production, deworming of calves/ housing of animals etc.

When it is the question of vaccination of livestock in a cluster of villages or region it requires a mass action and methods like campaigns are more ideal than group or individual methods. Similarly radio and TV broadcasts are best suited to transfer urgent messages like spread of a disease to wider areas. Although, TV coverage in India is very high/ its use as a medium for transfer of agricultural information is very limited. In India / TV and Radio are being used mainly for entertainment purposes. The potential of 'video technology as a means'. of development is almost left untapped (Singhal and Rogers, 1989).

Most of these mass methods are good in bringing about knowledge awareness among the audience rather than in taking decisions to adopt or not to adopt. However, publications (print media) serve little purpose when the intended audience is largely illiterate.

In all the situations the credibility of the source matters a lot. It is essential for the VAS to maintain very good contact with the livestock owners, as he should be considered as one of the credible sources of information by them. The VAS could use his contact with the livestock owners to pass on the useful information to them.

At present the veterinarians in the field are playing a dual role of Clinician as well as Animal Husbandry Extension agent. The veterinarian however/ is more a clinician rather than an extension agent as he/she spends most of his/her time in diagnosis and treatment of cases. But in the years to come with an increase in the gap between information available and information to be utilized on technologies or "make the information technology" accessible to the livestock owners/ he/she has to play an active role in acquisition/ processing and delivering relevant information to the livestock owners.

With an increase in the demand for livestock products (already forecasted) resulting in the increase in realization on the part of livestock owners to reduce the cost of production and / or increasing the productivity of animals will further accentuate their information needs. In addition, the veterinarian has to deal with livestock owners (people) more than they need to deal with their patients (animals) mainly because in future the animal mortality and morbidity will come down with increase in the availability of the disease diagnostic and preventive technologies. As a result in future the emphasis will be on the prevention of diseases rather than on treatment of animals.

7.1 Communication and Development of Livestock Owners

Livestock rearing is a very important secondary occupation to many a resource poor family especially the landless agricultural labourers. The contribution of these families to the national pool of livestock products is quite substantial which in fact enabled the country to claim its ranks in the production of milk and eggs in the world. Though/ a number of programmes are being implemented with a huge network of personnel under different agencies/private companies and NGOs and by expending huge sums of resources for the development of the livestock owners in the country, the fruits of these programmes could not reach a majority of them for various reasons.

Despite achieving phenomenal growth rates in livestock and poultry production and rapid advancements in communication research, the livestock development personnel are still to surmount some of the following challenges:

1. How to reach millions of livestock owners spread in every nook and corner of the country especially those who are thriving in Complex Drought and Risk prone (CDR) environment;
2. How to improve the living standards of the rural livestock owners through livestock rearing especially when the pressure on land is increasing and common property lands are slowly fading out forcing the rural poor to maintain the animals on purchased inputs especially concentrates;
3. How to sustain the production of livestock products with decreasing area under fodder and increase in the competition for feed resources and escalating livestock numbers; and
4. How to face the emerging livestock development situation as a sequel to the technological and development interventions.

The development personnel as well as the policy makers have to take cognizance of both planned and unplanned changes taking place in the society to sustain the production of livestock products. These changes include:

- **Shift from farming to industry:** Agriculture including livestock farming is considered as a low paid occupation and even the farmers with large holdings are turning towards industry. The traditional farmers are migrating to the urban areas to establish non - agricultural enterprises. Similarly, the youth are also not interested to continue their traditional family occupation.
- **Shift from rural to urban (migration):** With increase in the pressure on the land and dwindling opportunities for employment in the rural areas the rural people especially the landless agricultural labourers are forced to migrate to the nearby towns and cities for their livelihood.
- **Shift from grazing to stall feeding:** Area under fodder and grazing lands is decreasing with increase in the competition for food and commercial crops thus forcing the livestock owners especially, in the peri urban and urban areas to shift the feeding practices of livestock from grazing to stall-feeding thus increasing dependency on high cash inputs, e.g. purchase of concentrates from the markets.
- **Shift in focus from social to economic issues:** Sale of milk and cows is no more a taboo in most parts of the country. The livestock owners are not hesitating to sell even the young calves to butchers mainly because of the market push and economic pressure on the livestock owners. With increasing costs on inputs on which normally the Government exercises little or no control and marginal increase in the prices of outputs especially milk, the livestock owners are under pressure to produce milk and other livestock products economically. Low price for livestock products and high input prices continue to remain important constraints of the livestock owners. However, there is a tremendous increase in the production of various livestock products including milk, eggs, chicken etc which is attributed to the severe competition among the producers to produce economically.

Van den Ban and Hawkins (1998) predicted certain major changes in the task of extension organizations:

- Demand for agricultural products is increasing rapidly in many countries because of growing population and increasing incomes;
- Economic liberalization opens new opportunities for farmers to sell their products in the international market, but also increases their exposure to international competition; and

- Many present day farming practices are not sustainable. The development of sustainable farming practices often requires collective decision-making, whereas extension in the past mainly supported individual (Head of the family) in decision-making.

It has become at least as important for extension agents to help the farmers to decide on new farming systems as to adopt new production technologies.

Farmers obtain new information not only from the government agencies, but also from a rapidly growing range of information sources to which little attention is paid. Developments in information and communication technologies have opened up many new opportunities to obtain information. Farmers will only turn to extension agents for information in those fields where they provide more relevant, more reliable and more timely information at a cost lower than other information sources.

There are strong forces towards a change in the financing of extension organizations through privatization and financial support of governments to NGOs. The present livestock situation calls 'for a new look at the' problems experienced by the livestock owners in general and resource poor families in particular. In addition a change in the thinking of all the players in livestock development which include policy makers, researchers, extension personnel, input suppliers etc. is a prerequisite for contemplating changes in the communication behaviour of livestock owners. The communication needs of these players differ to a great extent depending upon their roles in the process of livestock development. These needs in turn decide upon the sources of information. The extension agencies help farmers to form opinions and make decisions through communication, which is necessary for technology transfer.

8. PRIVATISATION OF EXTENSION

In India, Animal husbandry extension is carried out mostly by the Departments of Animal Husbandry and to some extent by the Milk Unions, State Agricultural Universities (SAUs), Research institutions of ICAR and NGOs. The focus of these agencies is mostly on cattle owners and poultry farmers who are comparatively well organised. The owners of other species which include small ruminants and swine are neglected. The production, processing and marketing in case of milk, eggs and chicken are organized to some extent and the interests of the producers as well as consumers of these products are protected. The prices of eggs are fixed by National Egg Coordination Committee (NECC) and similarly the prices of milk are usually controlled by the Milk Federations. Whereas, the production, processing and marketing of meat, pork, beef and wool are almost unorganized and the owners of sheep, goat and swine are exploited by the middlemen in the villages. Though about 5 million families depend upon rearing small ruminants, no significant effort is made by any of the agencies to transfer the improved technologies to these families. The services of the DAH are limited to deworming, vaccination and treatment of animals.

Hithertofore, Animal Husbandry information and other technical inputs and services are being provided to the livestock owners through Government funding. However, some of the organizations are charging the livestock owners for the technical services such as performing AI, vaccinations, deworming, dehorning, treatment of cases etc.

With the increase of pressure on land and other resources and emphasis on efficiency on the use of resources, public spending on animal husbandry extension services is being questioned. Recognizing the limitations of public extension services in meeting the wide ranging demands for agricultural technology, it was suggested to promote private and community driven extension to operate competitively with public extension. The government expenditure on animal husbandry extension is justified in view of the fact that animal husbandry is one of the very important secondary occupation to a large population of poor cattle owners, which include small and marginal farmers and landless agricultural labourers. The livestock owners are being trained by different organizations by offering incentives to the trainees such as free lodging and board to encourage their participation in such training programmes.

The National Commission on Agriculture (NCA, 1976) recommended that cattle owners should be charged for AI in areas where it is popular. However, it is being done by collecting nominal charges by the Departments of Animal Husbandry, on cost basis by some of the Milk Producers' Cooperative societies and NGOs like Bharatiya Agro Industries Research and Development Foundation (BAIF). Similarly, the Milk Unions and AHDs are supplying cattle feed and vaccines on subsidy to milk producers. Some of the Milk Unions have implemented welfare measures like free cattle insurance, scholarships for children of the milk producers and accident insurance cover for the milk producers etc. In the case of poultry, wherever it is being run more on commercial lines

compared to other livestock, the Animal Husbandry Extension services are better organized and the poultry farmers are charged for almost all the services, which include vaccination, debeaking, post-mortem, diagnosis and treatment of chicks.

Contract farming or integrated farming : Poultry production with layers and broilers has extended into contract farming wherein the poultry farmers agree to provide eggs or chicken of certain quality and adhere to the management practices indicated by an agency in return for an assured market. The agency is responsible for supply of chicks, vaccinations, health care, poultry feed and purchase the output, chicken or eggs. The farmers' responsibility is to provide land, sheds and labour for maintenance. Consequently, the small-scale broiler and layer farms could not withstand the competition from the large commercial farmers and vanished from the scene. As a result where poultry production is highly commercialized the role of public extension has become limited.

The public extension service has still an important role to play in increasing the production of backyard poultry, which even today is the major contributor for egg and chicken production in the country. The AHDS continue to provide free inputs and technical services such as vaccinations to the backyard poultry.

Based on the study conducted on Privatizing Agricultural Extension in India, Rasheed and Sadamate (2000) suggested that the public sector should concentrate on organizing educational programmes for farmers, which are less attractive to the private agencies. The public sector should also take up the role as facilitator in the formation of farmers' groups, building linkages with other extension agencies and initiating paid consultancy services by maintaining a cadre of qualified staff at district and sub-district levels and some of these services can later be entrusted to the farmers' groups. Roberts (1987) is of the opinion that "private sector extension cannot completely substitute public agencies in those circumstances where direct benefits do not accrue to the firms involved, target populations are diffuse or remote, where infrastructure is inadequate and when production consists mainly of basic food grown by subsistence farmers."

Research clearly indicated that investments in agricultural research and extension yield high returns. Van den Ban (2000) dealt in detail about the ways of financing extension organizations and situations in which government should invest in agricultural extension. Ahuja and others (2000) concluded based on a study conducted in three States of India that there is a significant demand for the delivery of veterinary services at home and the cattle owners including the poor are willing to pay to receive these elite services.

9. MARKETING

Marketing is the performance of all business activities involved in the flow of goods and services from the point of initial production until they are in the hands of the ultimate consumer. It is a process by which the producer and buyer of goods are brought together.

The buyers of livestock products are those who

- i) purchase livestock products for direct consumption;
- ii) demand livestock products for use as intermediate goods; and
- iii) buy livestock products for sending them abroad i.e. exports.

The livestock and its products marketing is concerned with procuring raw materials (milk, sheep/goat, eggs), processing them (milk products, mutton/meat, egg powder), packaging, storing, transporting and distributing to the ultimate consumers. The main actors involved in this are the livestock owners (producers), middle-men and consumers.

9.1. Significance of Livestock/Livestock Products

Marketing

The livestock products marketing serves different purposes. It acts as a stimulant to the livestock owners to boost the production. Accessibility of marketing facilities to the livestock owners is vital for increasing production. It also helps in improving the availability of goods and services to the consumers located far away from the production point.

But for the modern marketing facilities, it would not have been possible to collect the raw materials from millions of small-scale livestock owners scattered in the country, process and distribute them to the urban consumers.

9.2. Special Problems in the Marketing of Livestock

Production

In addition to the usual problems encountered in marketing of goods and services, livestock products marketing involves some special problems which are indicated below:

- i. The livestock output is largely raw material which needs further processing. The process may be simple (eggs do not require processing) as in the case of sheep to mutton and complex as in converting milk-to - milk products like ice cream, cheese, milk powder etc. The raw material sold by the livestock owner soon loses its identity when it is converted into food.
- ii. Livestock products especially milk are both bulkier and more easily perishable than cereals. Hence transportation is difficult as it occupies more space and needs to reach the ultimate consumer fast. The storage and transportation needs special facilities, e.g. refrigerated milk tankers, deep freezers, chilling centres, spray dryers, meat-processing equipments, etc.
- iii. Seasonal production: Much of the livestock production is highly seasonal. There are peak and lean seasons for milk availability though the demand for milk is almost uniform throughout the year. To process huge quantities of milk in the peak season; more storage and processing facilities are needed, whereas in the lean season these facilities lie either unutilized or underutilized. This leads to increased costs in marketing of livestock products.
- iv. The quantity as well as the quality of livestock products are influenced but not controlled by the producers. The quantity and quality depend upon a number of factors such as season, climate, breed, type of feeds, management practices adopted by the producers, etc. Because of these variations in quantity and quality of livestock products, there is imbalance in supply and demand of the products, fluctuation in prices and difficulty in applying uniform standards of quality.
- v. Livestock products such as milk come from very small dairy units and hence, pose special problems in procurement of small quantities of milk from scattered small producers.
- vi. The demand for livestock output is relatively inelastic and hence their prices rise steeply during lean production season (summer months for milk and milk products and winter months for chicken) and fall sharply in peak production season. Because of these fluctuations marketing of livestock output has to face the problem of price instability.

The main characteristics of livestock products which make the marketing more elaborate and complex are depicted in the paradigm below:

Characteristics of Livestock Products		
Production Characteristics	Product Characteristics	Consumption Characteristics
1. Small scale	1. More bulky & less value	1. Continuous
2. Scattered	2. Perishable	2. Regular & Small Quality
3. Seasonal production	3. Variation in quantity & Quantity	3. Inelastic demand
	4. Elastic supply	

9.3. Functions of Marketing

The important function of marketing is to move the desired kinds of farm products to consumers in the desired forms and conditions at lowest possible cost. The three principal marketing functions are assembling, processing and dispersion (Acharya and Agarwal, 1992).

i. **Assembling (Procuring)** : Assembling includes collection and concentration of goods of the same type from various sources of supply at centrally located places. It is necessary to meet the demand of consumers and to provide sufficient volume of business to retailers and wholesalers. This is a very important function because most of the livestock owners in our country are small holders maintaining few animals and are spread throughout the country.

ii. **Processing** : Except liquid milk and eggs, most of the livestock products are to be processed for final consumption. In addition, products like milk are to be procured to meet the demand in future and maintain the quality of the product for a longer period. The processing function hence involves a series of acts by which a product is converted into a more usable form for example live animals to meat, live fish to canned fish and frozen foods, milk- to- milk powder, cheese and ghee, etc.

iii. **Dispersion (Distribution)** : It is the opposite of assembling. It involves finding the location of potential buyers, quantity and quality products they prefer, and price they are ready to offer, in addition to sale of goods in good state.

To carry out these functions of marketing, certain other functions called "secondary services" are to be performed. These secondary services include (I) Grading (II) Packing (III) Transporting (IV) Storing (V) Financing (VI) Assuming risk and (VII) Selling.

9.3.1. Secondary services

The Secondary services assumed greater significance in view of the modernization of livestock industry, increased competition as well as demand for the livestock products and increased incomes. As a sequel-competition is also increasing. These services are briefly described below.

9.3.1.1 Standardization and grading

Standardization includes the establishment of standards, sorting and grading of products to conform to these standards. It is being followed in some products like liquid milk (toned milk, standardized milk, full cream milk depending upon fat and SNF content), eggs (Special, A, Band C grade), wool (coarse, medium, fine) etc. For other products such as chicken, meat, pork and beef standardization and grading are not being followed.

9.3.1.2. Packing

It is a process of putting the commodities into convenient containers or wrappers. Packaging contributes to efficient marketing in:

- i) reducing the bulk or volume;
- ii) facilitating handling and storing;
- iii) reducing shrinkage and spoilage;
- iv) facilitating quality identification and product selection by consumers; and
- v) assisting in advertising and better merchandising.

9.3.1.3. Transportation

It is primarily concerned with making goods available at proper places and at appropriate time. An efficient transport system enables the products to reach the markets far and wide without losing any precious time. It plays an important role especially in transporting highly perishable commodities like milk, meat and fish. With improvements in marketing, milk from Bangalore is being made available to the consumers in Calcutta through refrigerated rail tankers. Export of canned fish and beef provide another interesting example.

9.3.1.4. Storage

The livestock products like milk are produced in plenty during winter and monsoon months compared to summer months. But the demand or consumption for milk is almost constant throughout the year. This fact necessitates storing these perishable commodities in peak seasons to make them available in lean seasons.

Storage thus creates time utility. By converting liquid milk into products such as skim milk powder and butter oil which could be stored and used later for reconstitution of milk.

9.3.1.5. Financing

It involves the use of capital to meet the financial requirements of the agencies engaged in various marketing activities. Capital remains blocked for the period of collection of products to final distribution to the consumers. Hence, the finance function includes supply of credit and money needed to meet the cost of selling merchandise to the final consumer.

9.3.1.6. Risk-bearing function

Acceptance of loss in the marketing of a product is considered as risk. The risk can be physical (destruction of product by natural hazards) and market related (due to changes in market prices). Physical risk is very high with perishable products like, milk, meat, eggs, fish etc. However, physical risk can be minimised through insurance whereas, market risk can be reduced through accurate sales forecasting and market research, buying and selling on future markets.

9.3.1.7. Selling

All marketing services revolve around selling of a product, which includes transfer of title and collecting or receiving of payment. It also helps in identifying prospective consumers, stimulating demand and providing information and services to buyers.

9.3.1.8. Marketing margin

It is the difference between the amount consumers pay for the final product and the amount producers receive. This margin between farm prices and retail prices reflect the cost of marketing. In general the distribution costs of livestock products are very high and the livestock owner's share in the consumer's price is relatively small, compared to that of the middlemen in the market channel. The distribution costs in livestock products are high due to:

- i. Difficulty in procurement of products from a large number of scattered small producers;
- ii. Greater transport costs for bulky and low priced products;
- iii. Difficulties of grading due to wide variations in type and quality of livestock products;
- iv. Impossibility of maintaining regular production and supply;
- v. Greater need for storing and processing of livestock products to cope up with seasonality of production;
- vi. Perishable nature of livestock products, which necessitates special arrangements for transport and storage; and
- vii. Difficulty in maintaining food standards.

9.4. Defects in Livestock Products Marketing

There are many defects in the marketing of livestock and livestock products. Some of the important defects are presented below:

i. **Forced sales:** A large number of livestock owners are resource-poor and they do not have the capacity to withhold the product for a long time. Hence, they are forced to sell the produce almost immediately after its production even at lower prices.

ii. **Inadequate and expensive facilities of transport and communication:** The infrastructure facilities for transport and communication are inadequate as well as costly. This poses serious problems for the procurement and transportation of livestock products especially during monsoon season where the condition of the roads is awfully bad in the rural areas.

iii. **Inadequate storage facilities:** In rural areas there are few facilities like refrigeration and cold stores to store the livestock products, which are highly perishable. Hence, the milk producers have to dispose off the milk almost immediately after it is harvested from the cows both in the morning and evening. Eggs need to be disposed off within a week due to lack of cold storage facilities in the villages.

iv. **Unorganized market :** The livestock as well as livestock products marketing is in the unorganized sector and is controlled by middlemen who more often than not exploit the producers and consumers. Milk marketing to some extent (about 20%) is organized due to cooperative network, whereas in case of meat and wool, it is totally unorganized.

v. **Absence of grading & standardization :** Though standards and grades are prescribed for some of the livestock products, the concerned departments are not enforcing the standards. Practically since livestock products are in unrealized rural area neither standards nor grading can be applied.

vi. **Lack of marketing information** : Marketing information helps both the producers as well as the consumers and unfortunately both the parties are unaware of the supplies and demand and prices of the livestock products. In 'the absence of market information' the middlemen exploit both the producers and the consumers of livestock products.

9.5. Agricultural Marketing

The Directorate of Marketing and Inspection (DMI) under the Ministry of Rural Areas and Employment, Department of Rural Development advises the Central and State Governments on agricultural marketing policies and programmes and implements various schemes in agricultural marketing. The DMI is operating with its Headquarters at Faridabad and Branch Head Office at Nagpur and five Regional Offices in addition to 57 Sub Offices and 22 Laboratories spread all over the country.

The DMI is responsible for administering Agricultural Produce (Grading and Marketing) Act, (1937), which was later amended in 1986 to promote standardization and grading of agricultural and allied produce including livestock products. The grade standards are popularly known as "AGMARK" standards.

A number of important livestock products like deshi ghee, creamery butter, fat spread etc are being graded according to Agmark grade standards for domestic marketing. Obtaining quality certification is voluntary in respect of domestic marketing except for fat spread, for which quality certification is compulsory.

DMI is one of the designated agencies for pre-shipment inspection of agricultural products, which are to be exported. It implements the Meat Food Products Order, (1973), which was notified under Essential Commodities Act, 1955, which was later amended in 1994. The main objective is to enforce hygienic and sanitary standards and to exercise strict quality control over the production of meat food products.

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