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Livestock Development in Andhra Pradesh: Status and Potential

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Authors

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ABSTRACT

Trends show that the contribution of agriculture to national GDP has been steadily declining from 27.83% in 1994-95 to 17.62% in 2004-05 (Govt. of India, 2004). Juxtaposed against this, the contribution of livestock sector to agricultural GDP has been steadily growing. It was about 22.51% in 1999-2000 and has increased to 24.72% in 2004-05. In the milk production front, India continues to be the largest producer of milk in the world and India produce 13.1 per cent of the total milk produced in the world.

A recent survey carried out 64th round of NSS has shown that an Indian family allocates, on an average, 17% of the expenditure incurred on food products for milk and milk products, with rural families allocating 15%, and families in urban area allocating over 18%. The overall demand for milk and milk products is galloping compared to milk production.

In the situation of increasing population, urbanization and sustained rise in per capita income fuelling rapid growth in demand for animal food products in India, it is imperative to study how far these opportunities are helping the poor to enhance their incomes through livestock keeping. The growth rates in the livestock population of the state indicate that the growth is according to the demand for milk and meat. The farmers are rationally adjusting their livestock as per the demand. As poorer sections of the society and forest based communities keep large proportion of sheep and goat, the increase in the population of sheep and goat is expected to be more beneficial for these people as the demand for meat is higher than the demand for milk.

The management of fodder resources, utilization of different varieties of fodder for livestock depends upon the production system practiced by the farmers.Currently several poverty alleviation programmes and natural resource management schemes are being implemented in the state of Andhra Pradesh through various government line

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departments. All these programmes are implemented through identified /formed user groups at village level and operate in isolation. In the context of natural resource management at least four to six major programmes namely, watershed programme, community forest management programme, Andhra Pradesh Rural Livelihood Programme, AP drought adaptation initiative, VELUGU, National Rural Employment Guarantee Scheme are being implemented simultaneously at village level.

Therefore, there is need to develop the existing stock of the farmers by providing the required inputs in order to make livestock sector more beneficial for the poor. Further, there is need for new policy paradigm. Presently, world over there is a shift away from sectoral development.

1. Introduction:

In an agro-based developing country like India, natural resources provide basic livelihood support to rural people. Rural households are dependent on land, water, livestock and forests for generating employment and for earning their livelihood. In India, about 74% of the total population lives in rural areas of which 40% are the below poverty line. Among these, about 73% households keep livestock of one or another type and derive, on average, 20% of their total income from this source (Vandana Siva,1996).

In India, livestock plays a multi-faceted role in providing draught power for the farm, manure for crops, energy for cooking, food, milk and meat for household consumption as well as for the market. Livestock also provides raw material such as hides and skins, blood, bone, fat etc required for industrial use. This provides subsidiary occupation to a large section of the society particularly to the people living in the drought prone, hilly, tribal and other remote areas where crop production on its own may not be capable of engaging them fully. In the adverse climatic conditions and natural calamities like drought, flood etc., animal husbandry proved to be a boon for sustaining the livelihood of the landless and marginal farmers (CALPI, 2001).

The forest is seen as a natural resource base that can provide sustainable livelihood to the people living in and around the forests. Agriculture, both shifting and settled, is a primary livelihood activity of forest dependent communities. In addition to agriculture, the small holders keep livestock mainly on common property resources and free crop residues and use the available family labour for livestock production activities (Ashley et al, 1999). Thus, there is little or no cost of feeding the livestock such as cows, buffaloes, sheep and goat and hence livestock rearing is a predominant economic activity of the forest dwelling communities through which they earn their subsistence (Jodha, 1992)

This paradigm of livestock rearing is being operated for centuries together among the forest based communities. It was argued that, grazing restrictions imposed by the forest department and the reduction in the availability of fodder through grazing are the obstacles for these people to enhance their returns from livestock rearing and for the development of livestock owned by the small holders (CALPI, 2001; Amita Shah, 2004; Ramdas et al 2005). Further, it was emphasized that inadequate livestock services provided by the Animal Husbandry department and inadequate feed resources available hampers

the development of livestock qualitatively or genetically (Birthal and Thaneja, 2006; Acharya, 2011). However, there is no sufficient empirical evidence to accept or deny this hypothesis. Therefore, an attempt is made in this paper to analyze the status of livestock rearing in rural communities living in and around the forests; types of production systems adapted with reference to the available resources and productivity of the system; the share of livestock in the total household income; constraints perceived and possible strategies for the sustainable development of livestock in the forest based regions. Further, the chief objective of the paper is to identify various issues surfaced in the earlier studies related to livestock rearing in forest dependent communities. These issues and conclusions would be useful for analyzing the data collected in the study conducted for this purpose in Andhra Pradesh. This paper is organized into seven sections. The first section deals with the introduction of the paper and the second section highlights the significance of livestock in livelihood activities. The demand for livestock products is presented in the third section. The size and composition of livestock in Andhra Pradesh is analyzed in the fourth section. The livestock production systems are examined in the fifth section. The livestock development schemes initiated by various agencies are explained in the sixth section. The summary and conclusions are in the seventh section.

2. Livestock and livelihood:

India supports approximately 16% of the world's human and 18% of the livestock population on 2.5% of its geographical area, which also includes 1.8% of forest area according to the Forest Survey of India (2000). The recorded forest area is 76.52 million ha or 23.28% of the country's total geographical area of 328.73 million hectares, most of which (over 90 %) is under government ownership and managed by the state forest departments (Forest Survey of India, 2000). Forests contribute 1.7% of GDP of the country. However, this figure does not take into account its numerous non-market and external benefits and the vast amount of fuel-wood and fodder and other forest products collected legally or illegally (Biswas, 1988). In India there are an estimated 100 million people who live in and around the forests and another 250 million for whom forests constitute an important source of livelihood. Many of these are tribal people, who account for 6.59% of the total population and who depend on the forests as the main source of their livelihood (GOI, 2004). However, the area under forest has been subjected degradation due to various factors such as rehabilitation, agriculture, non-agriculture, mining and encroachments (Ratna Reddy et al, 2007).

Among all livelihood activities of households depend on forests, livestock rearing is a significant livelihood activity. A large number of cattle are maintained by forest dwelling communities in addition to sheep and goat. It is observed that dependence on livestock, both large and small ruminants, is higher in regions where the VSS forests are mere

scrub jungles (CPF, 2007). It is recognized that the dependence on forests for predominant livelihood types is up to 31% (Gopinath Reddy et al 2009). The types of forest-based livelihoods of the poorest sections of communities have been identified as NTFP based-57%, fodder for livestock (goats and sheep) -26%, fuel wood for sale - 12% and wood based craft making- 5%.The small holders keep livestock mainly on common property resources and free crop residues and use the available family labour for livestock production activities. More than 630 million people (74% of the population) live in rural areas. Of the total households in the rural areas, about 73 percent own livestock (Chawla, et al 2002). More importantly, small and marginal farmers account for three-quarters of these households, raising 56 percent of the bovine (cattle and buffalo) and 62 percent of the sheep populations. Income from livestock production accounts for 15-40 percent of total farm household incomes (Amita Shah, 2004). Thus, increasing livestock product demand will be a major factor in raising the rural incomes in general and of the rural poor in particular, provided that India's productivity is internationally competitive.

The livestock or animal husbandry sector provides large self-employment opportunities. It is estimated that one person gets employment throughout the year with two dairy animals (Rajagopal and Reddy,2005). Presuming that one family member per household is employed in looking after the livestock, 25 million people are estimated to be employed with the livestock rearing activity. Especially 70 million rural households primarily, small and marginal farmers and landless labourers in the country are getting employment opportunities in dairy farming. The dairy cooperative movement started in 1970 could drive a large number of these small holders from livestock as subsistence to an economic activity. Today, roughly about Rs 300 million is ploughed back to Indian villages on every single day in the form of milk value payment. But still there are millions of small holder farmers who are unorganized (pastoralists, small ruminant rearers, milk producers under informal segment etc.) and living in marginalized lands who could not participate and enjoy the economic benefits of this massive movement (Ashley et al, 1999). Meat from sheep and goat, and poultry is also another way of getting food and food security in India. Apart from food security it provides employment to millions of people. Thus, livestock sector not only provides essential protein and nutritious human diet through milk, eggs, meat etc but also plays an important role in the utilization of non-edible agricultural by-products (FAO,1997; Rajarathinam, 2010). Therefore, sustained growth in the livestock sector has a significant beneficial impact in generating employment and reducing rural poverty.

Women have an active role and extensive involvement in livestock production, forest resource use and fishery processing. Thus, the role of women in enhancing the livelihood

activities is considered as the "Engine of vehicle for Livelihood Promotion" (Rajarathinam, 2010). The major initiatives of women on various livelihood promotions include poultry, dairying, vegetable farming, sheep or goat rearing and other agricultural allied activities. In animal husbandry women have a multiple role. With regional difference, women take care of animal production. Their activities vary widely ranging from care of animals, grazing, fodder collection, cleaning of animal sheds to processing milk and livestock products. In livestock management, indoor jobs like milking, feeding, cleaning, etc. are done by women in 90% of families while management of male animals and fodder production are effected by men. Women accounted for 93% of total employment in dairy production (World Bank, 1991). Depending upon the economic status, women perform the tasks of collecting fodder, collecting and processing dung. Dung composting and carrying to the fields is undertaken by women. Women also prepare cooking fuel by mixing dung with twigs and crop residues. Though women play a significant role in livestock management and production, women's control over livestock and its products is negligible. The vast majority of the dairy cooperative membership is assumed by men, leaving only 14% to women (MOA 1994).

In recent years there is a spurt in the growth of women self help groups (WSHGs) especially in the southern states of India. There is empirical evidence that the WSHGs have helped in improving the social and economic empowerment of women. The income derived by the women through livestock rearing is utilized for purchase of food, education of children and for other family welfare activities (Ramkumar et al, 2004). However, there are controversial reports about livestock rearing as an income generating activity taken up by the members of WSHGs. Though livestock rearing is a preferred income generating activity among the members of the WSHGs, it was discontinued by majority of the members of WSHGs in Kerala state (Natchimuthu et al, 2010). The reasons for discontinuance were higher mortality of animals, repeat breeding, decreased milk yield, lack of proper skills to maintain high yielding animals etc. However, it was observed that dairying as an income generating activity by women in WSHGs was successful program in Kerala (Narmatha, 2007) and in Haryana (Feroze and Chauhan, 2010). In rural India, agriculture and allied industrial sectors employ as much as 89.5% of the total female labour. Women have extensive work load with dual responsibility for farm and household production. Women's work is getting harder and more time-consuming due to ecological degradation and changing agricultural technologies and practices. Therefore, it is necessary to study whether livestock rearing is remunerative livelihood option for the rural women or not.

Thus, the importance of livestock sector cannot be measured purely in terms of its contribution to GDP. It plays a very crucial role in generating employment for the

weaker sections of the society. Rapid growth in livestock sector could be an additional factor in the efforts at improving nutrition and relieving from poverty (Brithal and Thaneja, 2006). The growth in the livestock subsector is expected to contribute in combating rural poverty, as the livestock elements are largely concentrated among the marginal and small farmers in rural areas. Nearly 70% of livestock in India is owned by 67% of small and marginal farmers and by the land less (FAO,1997).

Though the livestock rearing is embraced by the rural households as a means of income and employment, this activity is often considered as a means of environmental degradation. The predominant role of livestock in meeting the livelihood strategies of households has lead to the degradation of forests and grazing areas as forest land is mostly used for grazing of cattle, sheep and goat. Sheep and goat are confined to fringe forests however, cattle go deeper in to the forests. Over the years, sheep population in Andhra Pradesh has grown by 167% and goat population by 70% with increasing number of poor, landless tribal groups depending on small ruminant rearing. However, forest area has remained more or less same, with the fodder production capability decreasing every year (World Bank, 2001). Thus, there is widening gap between fodder demand and fodder production from forest lands even though small ruminants consume a lot lesser than bovine species (each sheep or goat is equal to 0.2 livestock unit while cow is 1.0 and buffalo is 1.2 livestock units) (Forest Survey of India, 1997).

The growth in livestock populations, coupled with shrinking grazing areas, has put intense pressure on existing pastures, encouraged encroachment into forest lands, and contributed to the degradation of land resources (GOI, 2001). In the absence of adequate productive pasturelands and a grazing policy, forests have become the major source of grazing and fodder. In case of forested villages (VSS), decreased CPRs has led to increased dependence on forests for fodder resulting in inter-community conflicts, and destruction of forest resources due to excessive human activity during grazing (Surya kumari et al 2002). It is estimated that around 60% of the livestock (about 270 million) graze in forests. These include traditional sedentary village livestock and migratory animals herded by ethnic grazers. Additionally, grazers collect about 175 million tons of green fodder, annually, by lopping and harvesting grasses. This also adversely affects the regeneration of forests (Kishan Das, 2007, Forest Survey of India, 1997). Land availability for fodder production is a problem since common property resources are now mostly devoted to horticultural activities. Livestock especially small ruminants are taken for grazing on fallow lands of the village. Regeneration period of the fallow lands has been shortened considerably leading to sinking water tables and poor quality top soils, both detrimental to a luxuriant growth of fodder species on these lands (Kishan Das, 2007). Thus, livestock development needs to be balanced with environmental conservation.

The present situation is that decreasing grazing lands, land encroachments, government redistribution and development programs have resulted in less availability of CPRs for grazing and thus forests have become the main source of fodder for livestock of the people living in and near forests. At any given time, the total livestock population, both large and small ruminants, coupled with migratory livestock from neighboring areas is much more than the availability and carrying capacity of the existing CPRs and nearby forests (Reddy, 2011). In these regions fodder scarcity is experienced mostly during summer. It is during this time that the small ruminant and migratory cattle population increases considerably, causing excessive damage to the environment, forests in particular, as there are no alternative sources of fodder available.

With the number of small ruminants growing every year fodder regeneration activities should be given top priority. Animal Husbandry department's efforts towards fodder development include: feeding concentrates in sheds; provision of mineral bricks/ salt licks in the sheds; demonstrations to prepare economic concentrate feed mix; motivation of the livestock keepers to cultivate fodder and to grow fodder trees; awareness programs for fodder development (Zaheeruddin,2007).

Therefore, fodder availability is a major constraint for the livestock development. Due to various government welfare programs, number of livestock in rural areas has gone up considerably with more number of animals competing for limited amount of fodder grass available on the grass and forest lands. Thus, fodder development in the context of small ruminants is primarily 'resource management'. But the present migratory and grazing practices of the small ruminant herders necessitates the involvement of both livestock as well as non-livestock rearing communities to manage the resources of fodder development. Encouraging the livestock keepers to adopt semi-intensive feeding practices for small ruminants is very vital as it would allow the livestock keepers to participate in resource management. Fodder development needs to be treated as a convergence activity as individual departments have limited mandate and can not address the problems holistically (Padmakumar, 2007). The management of fodder resources, utilization of different varieties of fodder for livestock depends upon the production system practiced by the farmers.

Currently several poverty alleviation programmes and natural resource management schemes are being implemented in the state of Andhra Pradesh through various government line departments. All these programmes are implemented through identified /formed user groups at village level and operate in isolation. In the context of natural resource management at least four to six major programmes namely, watershed programme, community forest management programme, Andhra Pradesh Rural

Livelihood Programme, AP drought adaptation initiative, VELUGU, National Rural Employment Guarantee Scheme are being implemented simultaneously at village level. All these programmes not only have mandates for fodder development but also have components that support /increase fodder production /availability at village level. In-spite of existence of so many provisions, the livestock rearers still face problems in accessing fodder needed for their animals. All government schemes and programmes are against the rearing of goats despite it being the most lucrative option for communities in drought prone areas.

Controversy over goat rearing: Among the livestock, rearing of small ruminants (sheep and goat) is very important source of livelihood system of the forest dependent poor households. Among sheep and goat, rearing of goat is comparatively higher and more preferred by forest dependent communities. Due to declining returns from agriculture small farmers are taking to the rearing of sheep and goat in ecologically fragile areas. Rearing of sheep and goat or small ruminants is not capital intensive and hence it is easy to start. Forests and grazing lands provide free grazing that saves about 70% of the maintenance cost of these animals. About 5.31 lakh rural families belonging to socially and economically backward classes are involved in this activity (Venkateswarlu, 2007). Further, as per the livestock census the goat population almost doubled in 30 years, from 76 million in 1977 to 140.5 million in 2007. The rate of increase in goat population in the past five decades has been the highest among all ruminants. This highest growth rate is registered despite highest annual slaughter rate of 38%.The reason is that goat can survive in harsh environment and still provide some profit (Down to Earth, 2010). Goat's biology makes the trade competitive compared to one crop under rain-fed farming. From the age of one year they are able to conceive and breed twice a year. Most of the time they give birth to twins or triplets and hence more returns from them. Further, the rising demand for goat meat, both domestically and internationally, encourages the farmers to rear goat in large number.

However, the rearing of goats gives good returns as long as fodder is free. Unlike cattle and buffaloes that are fed partially or fully on crop residues, goat and sheep are maintained through grazing on waste lands, common grazing lands and forests. The change in cropping pattern and distribution of waste lands to poor people makes the area of grazing lands to decline. In these circumstances herders have to take their stock to either to other areas on migration or to the nearby forest areas. Since the grazing land is diminishing in other areas also the pressure on forests would be higher. Between 1960-61 and 2003-04, land under permanent pastures and forest grazing land decreased by a fourth, from 13.97 million hectares to 10.44 million hectares (Down to Earth, 2010). In the same period goat population has more than doubled. Winrock International

estimates that 272 million livestock graze in forest land and 78 percent forest area in India is subject to grazing. According to BAIF Development Research Foundation, forest areas are overgrazed, with 100 million cow units grazing in forests against a capacity of 31 million in 2004-05. Forest officials think that the damage done by the goats to the forest is the maximum among all the livestock due to their grazing habits. An area where goats graze is not likely to regenerate because they eat the rootstock of the grass (Zaheeruddin, 2007). Thus, in order to protect forests from the goats and herders, forest department has imposed restrictions on grazing of goat. However, the restriction adversely impacted the livelihoods of many sheep and goat rearers, particularly the landless, leading to perpetual conflicts (CALPI, 2001). In fact livestock are eco-friendly and efficient users of the crop residues and available biomass. They contribute to the grasslands by dispersing valuable grass seeds, keeping unnecessary weeds in check and by fertilizing the soil with their dung and urine. In turn they consume grass that cannot otherwise be consumed by humans and convert it to a range of valuable animal products such as milk, meat, wool, manure and draught power. As natural grasses are not available throughout the year, migratory or semi-migratory systems of livestock rearing are practiced, particularly by the pastoralists and, sometimes in acute water and fodder scarcity situations (S. Ramdas and Ghote, 2003).

The present scenario of feeding of small ruminants is mostly free range grazing, competing with large ruminants as there are no separate grazing areas, and they resort to feeding ground nut hulls, tree leaves and pods, rice bran, "pillipesara" and horsegram during summer season. Severely restricted grazing resources have necessitated reduction of the stock of small ruminants and resorted to early disposal and migration (Venkateswarlu, 2007). It is observed that only 5-10% of the cost of rearing small ruminants goes towards the feeding cost, any interventions that propose to proceed by increasing the feeding cost will not be accepted by the rearers. In the context of fodder production on the cultivated lands, fodder economics does not commensurate with opportunity cost of land. As goat rearing is the poor man's survival response to an ecological crisis, it is necessary to study the conditions of herders of sheep and goat and the changes in the number of sheep and goat as against cattle and buffaloes reared by the forest dependent communities. Sheep and goats being a private resource that survive on common resources, grazing and forest land, it is imperative to develop a clear policy on sheep and goat rearing.

India's biodiversity is rich and unique. It is one of the 12 mega diversity countries in the world having vast variety of flora & fauna, which collectively account for 60-70% of world's biodiversity. Its ten bio-geographic regions represent a broad range of ecosystems. India has world's 6% flowering plant species and 14% of world's avian fauna (World

Bank 1996). As the degradation of forests and its biodiversity is attributed the rearing of livestock, it is necessary to find a balance between conservation of forests and development of livelihood activities of the forest based communities. Different stakeholders held different views on conservation of forests; some supporting the livestock based livelihoods of the poorest and some others on protection of forest ecosystem. What is required is the protection of forest ecosystem while giving opportunity to the poor to earn their livelihood from the forests.

3.Demand for livestock products:

With a GDP annual growth rate of 8% (driven mainly by industrial growth of 9% and service sector growth of 9.8%) India ranks today as the world's fourth largest economy in terms of purchasing power parity (after US, China and Japan). Agriculture and allied sectors contribute nearly 18% of Gross Domestic Product (GDP), while about 65-70% of the population is dependent on agriculture for their livelihood. Trends show that the contribution of agriculture to national GDP has been steadily declining from 27.83% in 1994-95 to 17.62% in 2004-05 (Govt. of India, 2004). Juxtaposed against this, the contribution of livestock sector to agricultural GDP has been steadily growing. It was about 22.51% in 1999-2000 and has increased to 24.72% in 2004-05. In the milk production front, India continues to be the largest producer of milk in the world and India produce 13.1 per cent of the total milk produced in the world. At present the first five countries in the world producing maximum milk are India, USA, Russia, Germany and France. At the beginning, production of milk was only 17 million tons (MT) in 1950-51 in India. Now it increased to 104.8 million tons in 2007-08. Despite a higher growth rate, the per capita availability of milk in India is 252 grams per day which is lower than the world average of 265 grams per day.

The meat products industry in India is largely in the un-organized sector. Cattle, buffaloes, sheep, goat, pigs and poultry are the types of animals which are generally used for production of meat. There is a huge scope for expanding exports, especially in buffalo and poultry meat, eggs and dairy products. Slaughter rate for cattle as a whole is 20%, for buffaloes it is 41%, pigs 99%, sheep 30% and 40% for goats. The country has 3,600 slaughterhouses, 9 modern Abattoirs and 171 meat-processing units licensed under the meat products order. The production of meat has increased 1.9 million tons to 23 million tons from 2001 to 2007. Poultry is one of the fastest growing segments of the agricultural sector in India today. Their growth rate has been rising at 8 to 10 percent per annum. As a result, India is now the world's fifth largest egg producer and the eighteenth largest producer of broilers (Birthal and Taneja, 2006).

Demand and supply patterns of milk and meat and the role of livestock are rapidly changing at the global level. In the next two decades the livestock sector is projected to

become the world's most important agricultural subsector in terms of the production of value added products. The growing urban and affluent population in the developing countries will most likely demand a richer and nutrient diet with more meat and milk products. As a result global meat demand is projected to grow from 209 million tons in 1997 to 327 million tons in 2020, and global milk consumption from 422 million tons to 648 million tons over the same period. This could appropriately be termed as "Livestock Revolution" (Delgado et al 1999). Further, over the last few decades the consumption pattern of food items in the country has changed dramatically (IFPRI, 2005). Between 1977 and 1999 the per capita cereal consumption declined by 20%, while there was significant increase in the consumption of fruits (553%), vegetables (167%), milk products (105%) and meat, eggs and fish (85%). As the demand for animal food products is more income elastic, as compared to staples there would be great demand for livestock products as the household incomes are on the rise. It is reported that the per capita consumption of milk has increased by 71% in 2000 compared to 1983 (43 kg per annum in 1983 to 73.5 kg in 2000), while poultry meat by 133% (0.3 kg to 0.7 kg) during the same period (Bardhan ,2007; Kumar and Birthal, 2004).

A recent survey carried out 64th round of NSS has shown that an Indian family allocates, on an average, 17% of the expenditure incurred on food products for milk and milk products, with rural families allocating 15%, and families in urban area allocating over 18%. The overall demand for milk and milk products is galloping compared to milk production. Unfortunately, there has been deceleration of growth in the milk production in India. The dairy sector had a growth rate of 4.25% in the 8th plan, 4.07% in the 9th plan and only 3.19 % in the 10th plan(Bhasin, 2010).

Sustained economic growth and increase in per capita incomes are expected to boost livestock product demand substantially. Recent estimates of livestock product demand in the year 2020, assuming that the economy consistently grows at 5.5 percent per year, and population growth, price and income elasticity of the past ten years remain stable, indicate that demand for milk will increase by a factor of 10 to about 497 million tons by 2020. Demand for eggs and poultry meat will increase by a factor of 7 to 7.21 million tons and 1.35 million tons respectively, while demand for mutton will increase by a factor of 8, reaching 2.5 million tons. If output growth rates between1980-92 are maintained, poultry, beef and mutton demand will be adequately met by domestic supplies (Delgado et al 1999; Birthal and Taneja, 2006; Ramadas, 2003). If the milk output growth rate is maintained, a deficit of almost 200 million tons is expected. Meeting domestic consumption growth, therefore, poses a particular challenge for the dairy sector. If Indian dairy farmers are to capture the demand-led growth opportunities, policy changes are necessary to foster efficiency and productivity growth at the farm

and processor levels. However, the increase in demand for livestock products will exert heavy pressure on the available natural resources such as pasture lands and forests. This increase might crowd out poor, endanger global food security and food safety, and affect animal welfare (World Bank, 2001).

In the situation of increasing population, urbanization and sustained rise in per capita income fuelling rapid growth in demand for animal food products in India, it is imperative to study how far these opportunities are helping the poor to enhance their incomes through livestock keeping. Developing countries, such as India, are expected to be the most important suppliers to the growing market of livestock food products. Among these livestock products meat is expected to be produced from the livestock reared by the forest based communities whereas milk is expected from the farmers situated in agriculturally prosperous regions as well as from forested based households. For this to happen there must be unprecedented growth in the population of sheep and goat for meat production and cow and buffalo population for the expected increase in milk production.

Therefore, there is great opportunity for the livestock keepers to earn gainful employment through livestock keeping by adjusting their livestock composition according to the demand. By analyzing the changes that have occurred in the livestock population over the years, one can draw conclusions whether the livestock keepers in the state have changed their livestock population rationally or not.

4. Growth of livestock in Andhra Pradesh

Andhra Pradesh stands number one in the country in sheep population, meat production (556000 MTs), poultry population and per capita availability of eggs, according to 2007 livestock census. The state also stands second in buffalo population, third in total livestock population and fourth in milk production (89, 25,000 MTs) in the country (Chawla, et al 2002). It is considered that sustained growth in the livestock sector has a significant beneficial impact in generating employment and reducing rural poverty.

Trends in livestock population: According to livestock census-2007 the total livestock population of Andhra Pradesh is 601.75 lakhs, excluding poultry. Among these 244.94 lakhs are cattle and buffaloes (total bovines), 255.39 are sheep and 96.26 lakhs are goats (Table-1). Significant growth in the cattle, buffalo, sheep and goat population is registered between the years 2003 and 2007. During this period, cattle population increased by 19.09% and buffalo population increased by 23.25% (see Graph). The decline in the number of male buffaloes and a rise in the number of male cattle and cows indicate that the farmers are raising cattle for both milk and draught purpose where as buffaloes are maintained for milk production in the state.

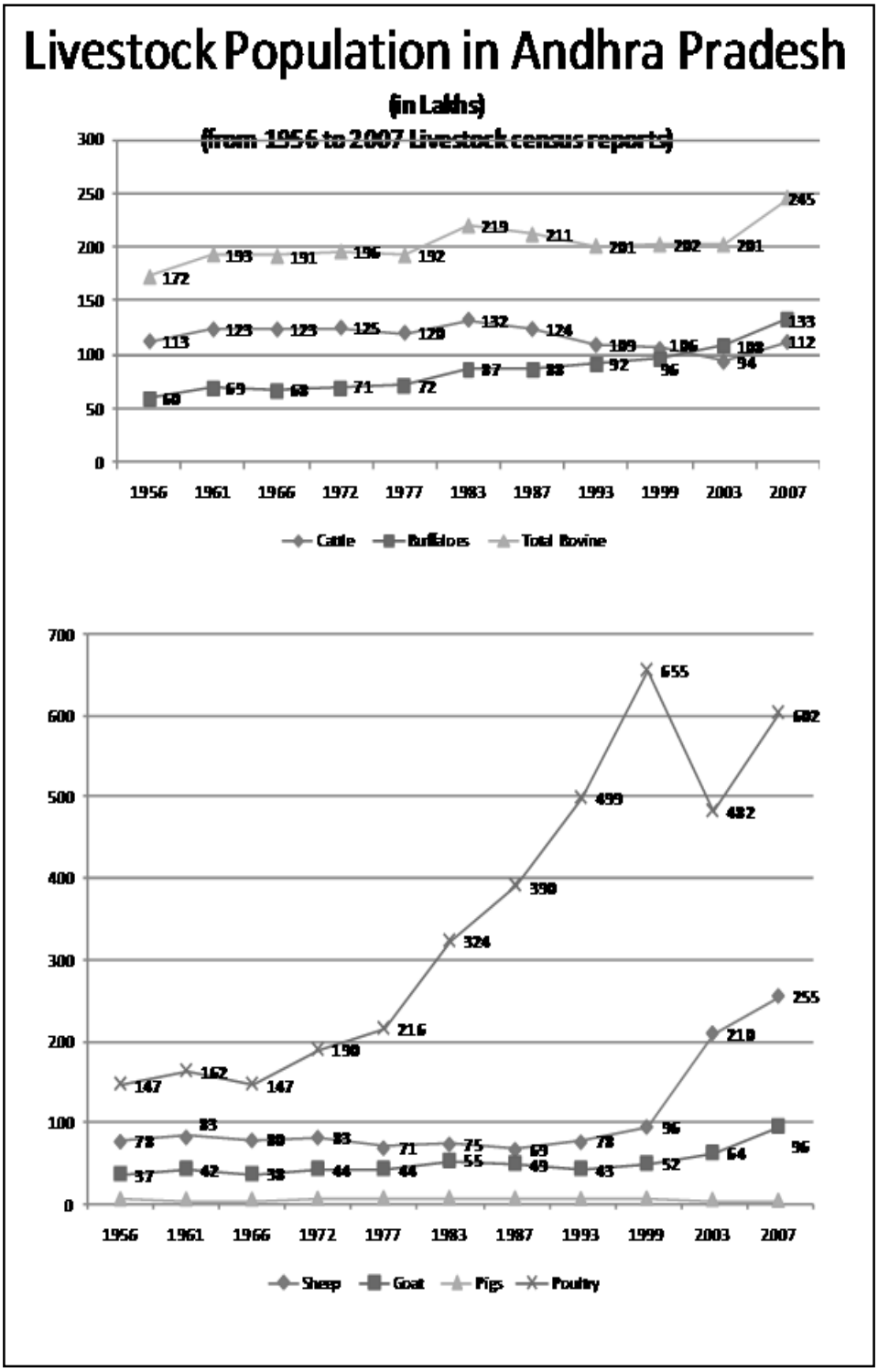
Livestock Population in Andhra Pradesh
(in Lakhs)
(from 1956 to 2007 Livestock census reports)
300
250
200
150
100
50
0
1956 1961 1966 1972 1977 1983 1987 1993 1999 2003 2007
172 193 191 196 192 219 211 201 202 201 245
113 125 125 125 120 132 124 109 106 108 112
60 69 68 71 72 87 88 92 96 94 133
Cattle
Buffaloes
Total Bovine
700
600
500
400
300
200
100
0
1956 1961 1966 1972 1977 1983 1987 1993 1999 2003 2007
147 162 147 190 216 324 390 499 655 482 602
78 83 80 83 71 75 69 78 96 210 255
37 42 38 44 44 55 49 43 52 64 96
Sheep
Goat
Pigs
Poultry

Table-1: Livestock Population of Andhra Pradesh (in lakhs)

S. No.	Particulars	1993	1999	2003	2007	Annual growth rate (%)		
						1993-1999	1999-2003	2003-2007
1	CATTLE							
A	Males	52.48	49.15	39.71	43.45	-1.09	-5.19	2.28
B	Females	30.26	29.23	29.24	35.50	0.58	0.01	4.97
C	Young stock	26.73	27.64	25.29	33.28	0.56	-2.20	7.10
	Total cattle	109.47	106.02	94.24	112.23	-0.53	-2.90	4.46
2	BUFFALOES							
A	Males	6.56	6.52	5.39	4.75	-0.10	-4.65	-3.11
B	Females	48.23	51.70	59.22	70.32	1.16	3.45	4.39
C	Young stock	36.74	38.36	43.07	57.64	0.72	2.94	7.56
	Total buffaloes	91.53	96.58	107.68	132.71	0.90	2.76	5.36
3	**TOTAL BOVINES**	**201.00**	**202.60**	**201.92**	**244.94**	**0.13**	**-0.08**	**4.95**
4	Sheep	77.87	97.43	210.15	255.39	3.81	21.19	5.00
5	Goat	43.29	52.13	64.27	96.26	3.15	5.37	10.63
6	Pigs	6.48	7.48	5.49	4.39	2.42	-7.44	-5.44
7	Other livestock	0.48	0.47	0.37	0.77	-0.35	-5.81	20.11
8	**TOTAL LIVESTOCK**	**329.12**	**360.11**	**482.20**	**601.75**	**1.51**	**7.57**	**5.69**
9	Poultry	498.83	633.96	1005.80	1239.85	4.08	12.23	5.37

(*Source:* Livestock Census Report, 2007)

Sheep and goat population increased by 21.53% and 49.77% respectively during 2003 to 2007 (Livestock Census Report, 2007). As per the national livestock census the goat population in India almost doubled in 30 years, from 76 million in 1977 to 140.5 million in 2007. The growth rates in the livestock population of the state indicate that the growth is according to the demand for milk and meat. The farmers are rationally adjusting their livestock as per the demand. As poorer sections of the society and forest based communities keep large proportion of sheep and goat, the increase in the population of sheep and goat is expected to be more beneficial for these people as the demand for meat is higher than the demand for milk. On the other hand, it is observed that the change in the livestock population, both in terms of numbers and composition, and the shifts in livestock composition and ownership patterns have not happened naturally but as a response to several development policy choices made by the state over the years (Sagari, 2003).

According to the NSSO (National Sample Survey Organization) 54th round, a mere 56% of the households reported ownership of at least one livestock in 1998-99. Change in livestock population and composition has varied across different landholding categories, with the decline in livestock holding being sharpest amongst landless households. Surprisingly only 15-20% of households own sheep and goat. Micro-level studies carried out in Gujarat, Andhra Pradesh and Orissa confirm the broad trends that obtained in the NSSO studies. Limited livestock ownership amongst the poor and landless households might further reduce their stakes in common property or natural resources, which is not only iniquitous but also reduces their coping ability particularly in vulnerable dry-land contexts. (S. Ramdas, 2003).

Since the livestock wealth is largely concentrated among the marginal and small landholders in India, it is expected that higher growth in the livestock sector would bring prosperity to the small holders. From the perspective of the poor, small animals like sheep, goats, pigs and poultry (backyard) are considered important because of their low initial investment, zero or low input requirement and quick returns to investment on a continuous basis (Birthal et al, 2006). However, the trends in the livestock sector provide a picture of how sector growth does not necessarily go hand in hand with poverty reduction. The landless poor are becoming increasingly marginalized (in terms of ownership as well as share in livestock population) with respect to small ruminants, pigs and poultry. There is an increasing exodus of the landless households out of livestock production, mainly because of reduced access to grazing resources, lack of access to non exploitative market, credit and other services (Delgado et al, 1999; Birthal et al, 2006). What happened to the poor landless and smallholder farmers who dropped out of the sector is an area to be studied to know the present status in respect of their well-being. In this context, it would be more appropriate to study about various factors responsible for the growth of livestock in Andhra Pradesh.

5. Livestock production systems and productivity of livestock

Profitability of the livestock rearing, success of breeding programs, the interactions between the livestock and the environment, and the extent of damage caused by the livestock to the environment depend on the production system adopted by the farmers to maintain the livestock. Certain distinct patterns or production systems of livestock farming could be observed in the area of livestock domestication. India has large agro-ecological and economic livestock production systems suitable for different levels of inputs and demands of communities with different social and economic status. Based on the degree of integration with crops and its relation to land, the livestock sector has been classified into three board production systems (Haan, et al 1996). These are grazing, mixed farming and industrial production systems. For better understanding, the

performance of these production systems could be examined vis-à-vis different agro-ecological zones i.e., forest area, high irrigation, medium irrigation and low irrigation zones (Vijaya and Reddy, 2007).

Table-2. Feeding practices of dairy animals across different production systems and agro- climatic zones

Production System	Agro-Ecological Zones	Resource Base	Main source of income
Grazing (zero input production system)	Forest area, Low irrigation zone Medium irrigation zone	1. Grazing and collection of fodder from communal lands 2. Feeding of crop residues	1. Calf (male calf) 2. Draft power 3. Meat 4. Manure
Mixed Farming (low input production system)	All the zones	1. Grazing 2. Feeding of crop residues 3. Feeding of collected green fodder from own lands 4. Feeding of concentrates such as rice bran, gram chunnies, gram husk etc in small quantities.	1. Milk 2. Calf (male and female calf) 3. Draft power 4. Meat 5. Manure
Industrial production system (high input and high output production system)	Urban areas and High irrigation zone	1. Stall feeding is totally practiced. 2. Feeding of purchased concentrates and crop residues 3. Green fodder from own lands 4. No or little grazing.	1. Milk 2. Meat 3. Manure

Source: (Vjaya Ch and Reddy MR 2007)

Grazing and Pastoral Systems: Among different types of livestock production systems, grazing systems are found in forest areas, low irrigation and medium irrigation zones (Table -2). In this system, the animals are largely maintained through the grass available from grazing lands. In other words, this livestock production system is based on zero (purchased) inputs provided to the animals and such animals are primarily maintained on natural feed resources from village commons, tree lopping and stubble grazing on cultivated lands after crops have been harvested (Acharya, 2011). The feed resources are

extremely limited in quantity and nutritional quality are seasonally available. The breeding is generally done naturally with whatever breeding males are available in the herd or in the village. No proper shelter is provided to the animals maintained in this system.

Table- 3: Milk production of dairy animals across different production systems.

Production System	Breed	Milk Yield (Liters/day)	Farmers who depend largely on the system
Grazing (zero input production system)	Local Cow Local Buffalo Graded Buffalo Sheep and goat	1.00 1.75 2.25	Landless Marginal and Small farmers Landless, Marginal and Small farmers
Mixed Farming (low input production system)	Local Cow Local Buffalo Graded Buffalo Crossbreed Cow	1.20 2.20 3.50 4.50	Marginal, Small, Medium and Large
Industrial (high input and high output production system)	Graded Buffalo Crossbred Cow	6.50 7.20	Large farmers and rich farmers

Source: (Vjaya Ch and Reddy MR 2007)

In the case of large ruminants, animals are taken for grazing on common tending basis or by the family members on all the days throughout the year. Apart from grazing, sometimes little amounts of crop residues like Paddy straw, Jowar straw etc., are fed to the animals at home. Therefore, the dependence on grazing lands is more in this system leading to degradation of the resource base. Forest based communities, landless poor and marginal farmers, who possess little or no land, mostly adopt this system and hence the extent of degradation of grazing lands would be higher. Calf, draft power and manure are important sources of income in the case of cattle and buffaloes maintained in the grazing system while meat (increase in number) and manure are the sources of income to households in the case of sheep and goat (Subramanyam et al 1995).

Maintenance cost of the animals reared under grazing system is very low since all the animals are maintained on the freely available grass through grazing. The productivity of the animals maintained in this system is low and needs to be improved (Table-3). However, restrictions on grazing, lopping trees and watering of goats and sheep, lack of recognition of customary rights to rear their animals and graze them in forests and other common property resources, low literacy levels and poor access to government

health facilities etc may come in the way of increasing the productivity of livestock maintained under this system.

Mixed farming or Crop-based Livestock Rearing Systems: In mixed farming system crops and livestock production are integrated on the same farm. Farmers derive their livelihood somewhat equally from agriculture and livestock. The crop residues and green grass available from the fields of the farmers are used as feed for the animals in addition to grazing. On the other hand, manure produced in the farm is used as fertilizer in the fields and the male progeny of cattle and buffaloes are used for traction (Traction, 2011). Therefore, resource use in mixed farming is often highly self-reliant as nutrients and energy flow from crops to livestock and back. Thus, such a closed system offers positive incentives to compensate for environmental effects (internalize the environmental costs), making them less damaging and more beneficial to natural resource base. This great system led to food surpluses and helped societies go beyond the level of mere subsistence.

The mixed farming system is predominantly found in the case of dairy production in India. This system is also referred as low-input and low-output production system as the average milk production of the animals is as low as 950 lts. per year (Acharya, 2011). Cattle are generally maintained on natural grazing, crop residues and cheap concentrate mixture based on home grown or locally available grains and cakes. Breeding is carried out using locally available bulls and artificial insemination. Proper shelter is not provided to the animals maintained in this system. The management of animals reared in this system also depends on the fodder available from grazing land. However, the extent of dependence and consequent degradation of grazing lands is governed by land holding size of the farmers. Marginal and small farmers engaged in this activity possess little land and thus exert more pressure on the grazing lands to maintain their livestock compared to medium and large farmers (Vijaya and Reddy, 2007). Milk, draft power, calf (male calf for draft purpose and female calf for milk production), manure and meat are the main sources of income from this system. Returns from the livestock rearing are higher in the mixed farming system compared to grazing system due to higher productivity of the animals. However, the milk production of cows and buffaloes in this system is lower than those maintained under industrial production system or commercial dairy farms indicating that the full potential of the animals is not realized through this production system. Where feed and management inputs are limiting, the average milk yield of dairy animals is 1500 kg per lactation. If feed and management resources are better, the milk yield ranges from 1500-3000 kg per lactation. However, the animals with higher level of milk production under low feed and management inputs are more prone to environmental stress and diseases (Acharya, 2011).

Through this mixed farming system, many interesting breeds of cattle have been developed. The availability of crop residues in large quantity and increasing demand livestock products made the farmers to go for crossbreeding of their cattle with exotic cattle breeds such as Jersey, Holstein Friesian and upgrading of buffaloes with well defined breeds like Murrah. Within this system, farmers having more dependence on grazing on forests and CPRs posses low yielding animals whereas farmers having less dependence on grazing developed high yielding animals (Reddy, 2011).

Industrial Production System / Modern Farming Systems: Industrial production systems or commercial dairy farms are observed both in rural and in urban areas. It is observed that the animals in commercial dairy farms are maintained on purchased feeds and fodders without grazing. As the dependence of this system on grazing lands is zero or little, the development of commercial dairy farms alleviates pressure for deforestation and degradation of communal lands, thus saving land and preserving biodiversity (Reddy, 2011). This system of livestock rearing could be more frequently seen in the case of cattle and buffaloes compared to sheep and goat. As this system is totally market oriented the existence of this system in the forest areas is negligible due to the economic status of the farmers (Vijaya and Reddy, 2007). Animals maintained under this system yields more milk than those in other systems. Therefore, this system is commonly referred as high-input and high-output production system. In the case of large ruminants, this is an intensive dairy production system involving a relatively large number of high producing crossbred cows or buffaloes. They are provided with adequate feed both green and dry fodder, and concentrates. The animals are properly housed under simple housing facilities (Acharya, 2011). Breeding programs are designed to develop high yielding progeny and to make the animals calve throughout the year and reasonably equal quantity of milk is available for sale throughout the year.

Presently, only a very small fraction of the livestock sector exists as industrialized systems. Examples include commercial poultry farms, dairy farms and a few commercial goat and pig farms. While industrial systems permit reduction of costs of production due to economies of scale, their social, environmental and public health costs may prove extremely expensive in the long run. Industrial systems require conversion of good agricultural land that can feed humans to fodder plots to feed animals. They accelerate the conversion of natural forests and grasslands to pasture. They concentrate large numbers of animals in a small area, leading to accumulation of animal waste which in turn contaminates air, soil and water, while increasing the risk of communicable diseases.

Intensification of livestock production under industrial production system has relied upon uniformity in the genetic composition of the livestock. For example, In India, particularly in Andhra Pradesh, 90% of the animals maintained in the commercial

dairy farms situated in cities and towns are Murrah and Graded Murrah buffaloes. Ninety percent of all North American dairy cattle and 60% of all European cattle belong to only one breed, the Holstein. Furthermore, it is estimated that by 2015, the genetic diversity within this breed will come from only 66 individual animals. Organized poultry farming across the world relies on a few multinational companies who have developed a handful of breeds for their supply of stock. Therefore, the industrial production system leads to the loss of biodiversity in cattle or buffalo species.

When the type of animals maintained under different systems are examined it could be seen that the type of cows and buffaloes maintained under grazing systems are of low quality and yields very little quantity of milk compared to other systems (Table-3). For instance, the average daily milk yield of graded buffalo is as low as 2.25 liters in grazing system as against 3.5 liters in mixed farming system and 6.5 liters in industrial system. Similarly, the milk yield of crossbred cow is low in mixed farming system compared to industrial production system (Vijaya and Reddy, 2007). The examination of production system vs milk yields clearly reveals the extent of dependence on grazing influences the milk yields of dairy animals. The dependence on grazing is more in the case of grazing system and mixed farming systems and thus the milk yields of the animals maintained under these systems are lower compared to industrial production system. The lower milk yields of dairy animals maintained under grazing system could be attributed to the scarcity of feed and fodder and the consequent low quality of animals. In case of mixed farming system, the fodder available to the animals is more than that of grazing system because this system is largely adopted by upper strata of the farmers. Similarly, the quality of the animals maintained under industrial production system is good and therefore, their milk yields are higher than those maintained in grazing and mixed farming systems. Large number of graded Murrah buffaloes and Crossbred cows are maintained in urban dairy farms. The greater milk yields of these animals could be partially attributed to their non-dependence on grazing. The analysis clearly emphasizes that a shift from grazing system to industrial production system increases the milk yield of dairy animals by 50-100 percent. Further, various studies on economics of milk production conclusively established that despite higher cost of maintenance and relatively lower price of milk, the crossbred cattle are more profitable than both the buffaloes and local cows due to higher milk productivity and better reproductive efficiency (Reddy 2006, Singh and Joshi 2009).

When the type of farmers vis-a-vis the production system they adapted are examined, it could be emphasized that the landless and marginal farmers adopt grazing system with low quality animals owing to their poor resource base and thus causes overgrazing of grasslands. However, the grazing system is extremely useful to the poor livestock

keepers with little or no integration with crops. It is mainly based on native grassland or common lands of the village. Landless agricultural laborers and marginal farmers possess little land and thus, they depend largely on the common property resources to feed their animals. It is the common scenario in most of the villages that the farmers send their animals for grazing, on common tending basis during day time. Thus, during grazing the livestock interact with the environment i.e., with land, water and, plant and animal biodiversity and thus leads to its degradation. However, these interactions are strongly determined by the agro-ecological conditions of the area and by the alternative sources of feed availability to the dairy animals. Therefore, it is necessary to consider these aspects while framing appropriate livestock development schemes in order to strengthen the livelihoods of households rearing livestock.

It is evident from the above analysis that the productivity of animals in grazing system are of inferior quality in terms of milk production. A shift from grazing system to mixed farming system enhances the productivity of animals by about 50 percent provided that farmers should have some land resources to generate feed required for their animals. In the case of forest based communities land holding rights must be settled. In the case of farmers adopting industrial production system there is increase in the milk production by about 70-100 percent. Thus, there is a gap in the productivity of dairy animals maintained by the farmers and dairy farms (Reddy and Subramanyam, 2002). Therefore, there is need to develop the existing stock of the farmers by providing the required inputs in order to make livestock sector more beneficial for the poor.

Livestock Biodiversity: A narrow genetic base as developed by commercial farming systems poses many inherent dangers. This narrow base carefully selected for a particular trait may be completely unsuitable to the emerging problems of the future. These include diseases and the increased demand for diverse livestock products. On the other hand, a wide genetic base makes it possible to carry out productive livestock farming under diverse conditions (Sahai and Vijh 2000). Most of the world's poor live in marginalized areas or forest areas where it is not possible to manage livestock farming under intensive conditions. Here livestock is reared to cater to a number of personal needs and demands such as draft, milk, manure and meat. Livestock rearing patterns are intricately woven into a delicate balance with other systems in their area. Further, specific species and breeds are associated and identified with their socio-cultural place in society (Scherf, 2000). Thus, introduction of breed development programs or new breeds or species of animals tend to upset the balance which has evolved slowly over many years. Wide genetic diversity of the livestock of forest based communities provides the people to continue to live a life of social, cultural and economic independence and dignity.

As for as the livestock production systems are concerned, it was the grazing system in which livestock was maintained after their adoption by human beings mainly for meat and traction. After the development of agriculture, livestock particularly cattle and buffaloes were used for milk, traction and manure. Later, the demand for milk paved way for the development of new breeds suitable for higher milk yield. At this point, it would be interesting to assess the status of livestock maintained by forest dwelling communities in terms of their need and opportunities available for the development of livestock.

6. Livestock development schemes

(a) Genetic improvement of livestock: Farmers in India keep a variety of livestock breeds to fulfill a diverse set of functions. Pastoral communities, forest communities, and land owning communities all have well- bred animals to suit their needs. Farmers keep well defined breeds of dairy cows, non-descript cows or Holstein or Jersey cows, well defined buffaloes or non-descript buffaloes for milk production as well as for draught purpose.

Similarly livestock keepers maintain selective breeds of sheep and goat for the supply of meat and wool. However, a large proportion of local or indigenous stock of low productive nature is seen with the poorer sections of society and with households residing in and around forests. Generally these local cows and local buffaloes possess poor production traits. They have lower level of milk yields (800-1000 kg/lactation), higher age at first calving and long inter calving periods. Therefore, there is need to improve these animals genetically in order to derive more income and employment through livestock keeping. In the case of cattle and buffaloes productivity of the animals is achieved through crossbreeding or grading up programs with well defined exotic or indigenous breeds. However, in the case of sheep and goat, breeding programs are designed to improve the animals with well defined local breeds because sheep and goat are to be maintained through grazing in the local area therefore, they can withstand the adverse climatic conditions as well as they can tolerate the locally prevalent diseases (Trivedi,2010). Thus, breeding policies should help the livestock keepers to develop their animals so that they produce and maintain strong and healthy animals meeting their requirements on a sustainable basis in their environmental and resource conditions.

India possesses a good number of recognized breeds of cattle, which represent less than 15% of the total cattle population. These are classified into milch breeds, draft and dual purpose breeds. During colonization and after independence also, Kankrej, Gir and Ongole cattle were exported to Australia and America for their beef quality. Even now we can see good number of Ongole breed cattle in Brazil. Our milch breeds such as Gir,

Tharparkar, Red Sindhi and Sahiwal are also popular in other countries, but their major drawback was reproductive inefficiency. Moreover, the bullocks of these breeds are very heavy and slow at work. Similarly, the cows of draft breed could not produce adequate milk to even feed their calves. Hence, these elite breeds were also neglected by the farmers because there was no scope for selection by culling due to sentimental values attached to cattle (Hegde, 1996). Further, the cattle and buffaloes of tribal people living in forest or hilly areas are of non-descript breeds and their upkeep is far from scientific lines. The milk production of the animals is very less as they are genetically poor and receive nutritionally poor quality feeds. This leads the tribals to generate less income from their livestock (Vijay et al, 2010).

The important cattle breeds of Andhra Pradesh are Ongole (exists in Guntur, Prakasm and Nellore districts), Krishna Valley (Krishna and Godavari districts), Punganoor (Chittor district), and Deoni (Adilabad district). All these breeds are dual purpose breeds, which are useful for both milk production and for draught purposes. Draught purpose breeds like Hallikar could also be seen being reared by people in Ananthapur and Kurnool districts. All these animals can withstand adverse climatic conditions and also suitable for rearing under grazing system and therefore many of these animals could be seen with the forest based communities. Deccani breed of goat and Nellore Jodpi breed of sheep are known for their disease resistance and quality meat and these breeds could be seen with the forest based communities.

Though the breeding policy of the state is to promote local breeds, due to procedural problems and subsidies, Animal Husbandry department is promoting crossbreeding among sheep/ goat breeds such as Deccani, Nellore, Jodpi etc. Therefore, native breeds are becoming scarce (Ramachandrudu, 2007). Nellore breed of sheep are close grazers and wherever they graze there is no regeneration and no food left for Deccani breeds which are slow eaters. Thus, Nellore breeds should not be encouraged on degraded lands (Venkateswarlu, 2007). Most of these animals are maintained in the forests and community pastures through free grazing. Both rich and poor farmers have been receiving vaccinations and veterinary services free of cost from the Government. Thus, the farmers have an incentive to expand their herd size without any financial burden, while seriously threatening the environment and eco-system (Hegde, 1996).

For sustained genetic improvement to occur in an agricultural system, there must be market incentives driving and meeting the cost of both the improvement as well as the increased risks associated with change in genotype and its interactions with environmental factors like diseases or drought. In the same way, increased performance in one trait or function, e.g. milk yield, leaner meat, may be offset by lowered performance in other traits, e.g. lower disease resistance or reduced suitability for traction. For instance,

crossbreeding of local cattle with exotic breeds like Jersey and Holstein Frisian improves the milk production potential of the progeny but reduces the disease resistance and heat tolerance power. The male progeny are considered unsuitable for ploughing and cart pulling activities. In these circumstances, farmers may resort to traditional breeding methods though the progeny is of inferior quality in terms of milk production. Breeding of local stock with dual purpose breeds like Ongole, Deoni etc would be better option for cattle development and this holds good for the famers residing in the forest interface. Therefore, understanding these multiple and often interacting production functions and taking them into consideration while defining improvement goals in livestock are prerequisites for effective livestock development.

Further, farmers can improve the quality of their stock through artificial insemination (AI). Artificial insemination services in India are still subsidized, including those provided by cooperatives and nongovernmental organizations. However, artificial insemination programs cover only about 10 million cattle and buffaloes, or about 10 percent of the breedable population. One exception is in Kerala State where coverage is more than 50 percent. Low conception rates (20-40 percent) and socioeconomic factors (including lack of access to the high cost of quality feeds, and lack of access to animal health services) are major factors contributing to the low adoption rate of AI facilities. The low conception rate is partly due to the ineffective management of the public artificial insemination institutions. Therefore, farmers are using the traditional methods of breeding by taking their animals to locally available bulls (Hegde, 1996).

Despite free vaccination of animals by government departments, endemic diseases, such as rinder-pest and contagious bovine pleuro-pneumonia, are still present in India. In addition, the intensification of production and the introduction of exotic breeds through artificial insemination have increased the incidence of other diseases, including foot and mouth disease, sheep pox, and infectious bursal disease (Gumboro) in poultry (JPSAssociates,1994). While indigenous stocks have some natural immunity to these diseases, the imported animals and the crossbreds that have been introduced to increase domestic productivity are more vulnerable to them. For example, foot and mouth disease occurs only in mild form in indigenous animals, but affects exotic and crossbred animals more severely. In 1987, estimates put the incidence of foot and mouth disease at about 200,000 animals a year, resulting in heavy economic losses (due to mortality, morbidity, and loss of milk production, reproduction, and draft power) amounting to Rs 51 million a year. In 1993 an outbreak of Gumboro disease killed 5 million birds in Andhra Pradesh alone (JPS Associates, 1994). Thus, achieving sustainable output growth and maximizing the production potential of the livestock sector will require more effective disease control and better access to production-enhancing technologies. Therefore, any breeding program addressing the needs of poorest sections of the society required to focus on keeping the

immunity of the local stock intact and the provision of effective veterinary facilities such as treatment, vaccination, de-worming etc. The breeding program should be reoriented to improve local breeds for meat, with strong farmer participation (Padmakumar, 2007).

Therefore, genetic improvement programs based on selection within local populations are generally recommended in low-input systems where animals that are well adapted and reasonably productive are required, to preserve the hardiness traits which are supposed to be present in these breeds. It simultaneously may also be an appropriate method for the conservation of local genetic resources as the indigenous populations could be a source of adaptability for specific environmental challenges such as disease and extreme climatic conditions, and a reservoir of worldwide genetic diversity for possible future changes in the current production systems. These are superior genes for some productive traits suppose to be "hidden" in native breeds that are maintained in large number by the resource poor farmers.

(b) Effect of livestock development schemes implemented: Animal Husbandry, being an important sub-sector to agriculture, is rapidly making its way into the rural economy providing gainful employment to a large number of small and marginal farmers and raise their economic status. Economic support programs like distribution of milch animals, sheep and poultry units have enormously helped the rural masses in bridging their income gaps. Besides conserving domestic biodiversity, it is a means of producing food in dry lands without depleting ground water resources. Currently several poverty alleviation programs are being implemented in the state of Andhra Pradesh through various government line departments (GOI, 2004). All these programs are implemented through identified/formed user groups at village level and operate in isolation. In the context of natural resource management, at least four to six major programs namely watershed program, community forest management program, Andhra Pradesh Rural Livelihood Program, A.P. drought adaptation initiative, Velugu, and National Rural Employment Guarantee Scheme are being implemented simultaneously at the village level. All these programs not only have mandates for fodder development but also have components that support fodder production or availability at village level.

Salient Features of the recent animal husbandry programs implemented in Andhra Pradesh:

- In order to provide necessary financial support to shepherds to overcome the sheep losses during disease outbreaks the entire sheep population in the State will be insured. During the year 2009-10, an amount of Rs.84.96 lakhs is allocated to insure 10 lakh sheep.

- Mass vaccination against Foot and Mouth disease with Government of India assistance has been implemented in Chittoor, Ananthapur, Ranga Reddy and Medak districts to capitalize export market since 2003-04. The scheme is extended to cover the bovine population in the entire State since 2007-08 under the 100% GOI assistance schemes such as Assistance to State for Control of Animal Diseases (ASCAD) and Rashtriya Krishi Vikas Yojana (RKVY).

- A programme of de-worming the Sheep belonging to shepherds of all categories of farmers twice in a year on free of cost basis was taken up, resulting in reduced early lamb mortality and improved growth rate due to increased disease resistance in sheep and continued during the year 2009-10.

- Government of India has sanctioned Special Livestock and Fisheries Package (Prime Minister's Package) under Animal Husbandry Sector for Rehabilitation of farmers in 16 suicide prone districts of Andhra Pradesh with a view to provide supplementary avenues of income to the farmers, with a financial outlay of Rs.247.07 Crores. Components of the Package include:

1. Induction of high yielding milch animals
2. Rearing support for Female calves of inducted animals
3. Feed and fodder support for inducted animals
4. Health Care of inducted animals
5. Breeding Services (Artificial Insemination and Oestrus Synchronization)
6. Establishing of Fodder Block Making Units
7. Establishing of Bulk Milk Cooling Units

- Government of Andhra Pradesh has decided to develop agriculture and allied Sectors which are farmer oriented. In this direction, Government have decided to formulate a Scheme called " Chief Minister's Special Package" for implementation of farmer oriented Welfare Programmes. During the year 2009-10 (up to 30-9-2009), 715 milch animals and heifers were inducted under this scheme.

- Government of Andhra Pradesh has introduced a scheme "Jeeva Kranthi Padhakam" since 2007-08, to support BPL families by supplying Breeding Rams, Ram Lamb Units and Sheep and Goat Units under Chief Minister's Package, to enhance the economic status of the targeted families. During the year 2009-10 (up to 30-9-2009) 7117 Breeding Rams, 554 Ram Lamb Rearing Units and 764 Sheep and Goat Units were grounded.

- During the year 2009-10 (up to 30-9-2009) 929 milch animals were inducted under Rashtriya Krishi Vikas Yojana.

- During the year 2007-08, 500 Integrated Livestock Development Centers were sanctioned in 8 districts of the State to increase the breeding operations in the uncovered areas. This scheme is implemented with the assistance of J.K.Trust Gram Vikas Yojana. All these Centres were established during the year 2008-09 and continued during the year 2009-10.

These recently initiated programs are more useful to both small ruminant and large ruminant keepers and help especially to the people below poverty line if implemented properly. As the forest based communities keep small ruminants in large number, compared to large ruminants, these programs are expected to be more beneficial to these people. To address animal health problems, disease control programs are undertaken by both the central and the state governments. The central government's programs focus on nationally important diseases, such as rinderpest, foot and mouth disease, tuberculosis, brucellosis, and contagious bovine pleura-pneumonia. In addition, the establishment of disease free zones has been proposed. Centrally planned schemes are usually implemented by the state governments, with the costs of the programs split evenly between the two levels of government. The state-level disease control programs cover diseases of more local importance, such as haemorrhagic septicemia, black quarter, anthrax, surra, and liver fluke infestation.

It is considered that despite the implementation of several such programs, needs of livestock keepers, especially small ruminants holders, are not being addressed adequately. All innovative and beneficial attempts made through these programs are in favour of large ruminants. Generally communities who own large ruminants are land-owned and are in a progressive situation compared to small ruminant keepers (CPF, 2007). The community forest management program is unable to cater to the needs of resource poor small ruminant keepers in particular, as the present stage of interventions required to be taken up or being implemented are focused at regeneration and productivity enhancement of forests which directly puts restriction on grazing. Further, there is no extension system in place for small ruminants, due to migration. The present veterinary department services are inaccessible to the rearers of small ruminants. Vaccines produced and provided are not based on the number and need (Ramachandrudu, 2007).

At this juncture it is opt to review various livestock development programs aimed at the development of poor households. The decade of the fifties began with a clear focus on developing our local bovine breeds both for draught and milch purpose. However, by the third five-year plan in the early sixties, dairy development, enhancing milk production

and transporting milk to urban areas became the cornerstone of government livestock development policy (Sagari and Ghote, 2003). Subsequent plans were dominated by the Operation Flood project, with an aggressive focus on replacing the local cattle breeds with exotic breeds like Jersey and Holstein Friesian, and local buffalos with superior varieties such as Murrah and Surti from Punjab, Haryana and Gujarat states. Fat content based pricing of milk in the organized dairy sector, coupled with a declining natural fodder base, were prime factors in pushing farmers towards rearing local buffalos instead of cattle, resulting in huge growths in buffalo population (World Bank, 1996). The eighth plan, in the early nineties does make passing reference to improving draught animals, but this was not matched with an operational plan or budget.

During these plan periods the schemes for other livestock species like small ruminants were minimal for some and completely non-existent for the others. Over the past nine five-year plans, the allocation of funds to Animal Husbandry and Dairying has come down from about 1.2% initially to about 0.2% in the ninth plan. Within these scarce resources, the largest allocations have been to the dairy sector. But these too have been declining. Perhaps the most critical problem, for direct fallout of the above processes, is the acute scarcity of fodder and water for the greater part of the year, resulting in reduced productivity of animals and high rates of disease and death (World Bank, 1996). These uniform 'bovine-centric' development plans, rooted in the green and white revolutions that promoted high-producing, resource-intensive breeds whose productivity hinge upon large quantities of water, fodder and labour, were completely inappropriate to the geographical and environmental diversity of India (Sagari,1999).

At present the state animal husbandry departments provide general support services to the livestock sector, including animal breeding, feed and fodder development, veterinary services, disease control and prevention, and extension. These departments are generally organized according to functional responsibility. The activities of the Animal Husbandry Department have been oriented towards health of livestock and increased production of milk, meat and eggs and to provide adequate bullock power for agricultural operations. The schemes of the Animal Husbandry Department have been formulated in pursuance to the well-laid National policies to improve the Livestock production, to fight hunger and to improve nutritional standards of human population and also provide technical support for the maintenance and improvement of livestock.

(c) **Delivery of livestock services:** In addition to planning of various development programs, what is crucial is proper delivery of livestock support services like disease control, fodder development and creating awareness about livestock rearing technologies. Further, the Indian livestock sector's ability to achieve its targeted growth in productivity and output will be greatly influenced by the quality, availability, and accessibility of

livestock services. The projected livestock population growth and the increased emphasis on more productive crossbreeds, coupled with other sectors' competing demands for financial resources will increase budgetary and administrative pressures on the central and state level animal husbandry and dairy departments. Indeed, ensuring an adequate supply of quality livestock services in the face of declining real spending on animal husbandry and dairy activities poses a serious challenge for the future (Umali, et al, 1994).

For efficient service in the delivery of livestock services it is argued that the role of state governments in the Indian livestock services sector must be adapted to market realities (World Bank,1996). The private sector can efficiently and effectively provide those services classified as private goods or toll goods. In the case of private goods, the user can exclusively appropriate the benefits and is thus willing to pay the private fees. Consequently, private suppliers can appropriate the returns for the delivery of these services. Examples include clinical services, artificial insemination and the production and distribution of veterinary pharmaceuticals. The private sector can also efficiently deliver toll goods. Toll goods are products or services whose supply does not diminish as a result of one person's use, but access to them can be restricted so that only those who pay for the product or service can enjoy their benefits.

(d) Livestock Marketing: The market for milk, both organized and unorganized, is very developed in India in every corner of the country. However, the market for live animals is not very developed. There are no separate markets for different species of animals (i.e. sheep, goats, cattle, buffaloes). Farmers usually bring their animals to the weekly or fortnightly village markets on foot or occasionally on trucks, where they are assembled in the market yard. Cattle and buffaloes, milk and draft, are assembled in the same yard, with most exchanges facilitated by brokers. Because of the lack of contacts in the terminal markets and/or access to transportation, local traders primarily perform the assembly function for wholesalers. Sheep and goats are similarly transported to the local village markets on foot or by truck if the market is distant and sold in lots of 10s, 20s or truck loads (around 200) to other shepherds, local butchers, and traders. Most of the sheep and goat are consumed locally. Vertical linkages between processors/butchers and livestock producers are quite rare. Farm-wholesale marketing margins amount to about 20-30 percent of the consumer price. Market facilities are generally inadequate or if available are poorly maintained. In most markets, for example, weigh bridges are not available. The marketing channel for wool is quite similar to that of meat, although the Government and the Wool Marketing Federation intervene more extensively in the market. Therefore, there is need to develop proper market facilities for the sale of small ruminants in order to obtain more benefits from livestock (JPSAssociates,1994; World Bank,1996).

Thus, the profitability of investments in the livestock sector is strongly influenced by the availability and quality of animal health and breeding services and access to improved technologies and credit. Animal health services substantially reduce livestock losses caused by sickness and premature death. Animal breeding services increase the productivity and efficiency of feed resource use. To achieve their full benefits, health and breeding services must be supported by a strong technology generation and dissemination service. Access to credit facilitates these investments.

6. Summary and Conclusions

Production and consumption of livestock products, the role of livestock, and the external and internal economic environment that affects the producers and the consumers across the globe are changing rapidly. In India, the livestock sector is emerging as one of the fastest growing sub-sectors within agriculture. The expectations are that this growth could further accelerate due to growing incomes and high income elasticity of demand for livestock products. These developments open up new opportunities for enhancing rural incomes and accelerating the pace of poverty alleviation in India. Hence, it is imperative to study various livelihood options of forest based communities and the role of livestock rearing in mitigating their poverty.

When the livestock rearing is a viable and remunerative activity, the livestock keepers increase the size of their livestock holdings or enhance the productivity of their animals by adopting appropriate breeding or production system. The enhanced productivity of the animals needs to be supported by the increased availability of feed and fodder resources, breeding facilities and proper delivery of the livestock services such as vaccination, treatment of the animals, supply of fodder seed, credit support and effective knowledge dissemination systems etc by the Animal Husbandry and other departments. All these factors have their stake in the development of livestock owned by the forest based communities in order to raise their income and employment opportunities through livestock rearing.

However, it was emphasized by many researchers that there is lack of adequate veterinary facilities and fodder development opportunities required for both small as well as big ruminants. The programs envisaged by the Animal Husbandry department show that there is enough support by the government. Thus, there is a need to study the extent of livestock holders setting benefit out of these programs and also the constraints faced by the households in this regard.

Further, identification of suitable method of livestock rearing would go a long way for the development of livelihoods of resource poor households. The analysis of livestock production system and the productivity of the animals indicate that the productivity of

animals in zero-input or grazing system is poor in terms of milk production. A shift from zero- input or grazing system to mixed farming or low-input system enhances the productivity of animals by about 50 percent, provided that farmers should have some land resources to generate feed required for their animals. At this juncture, the analysis of the state of livestock owned by the forest communities, whether they are in the primitive stage of grazing system serving only for agricultural purpose or in the state of dual purpose breeds or in the developed state of milch purpose breeds, vis-à-vis the needs of the farmers of the area would go a long way in developing proper policy for sustainable livestock development.

Thus, increasing livestock production may be constrained by climatic effects, feed shortage, disease risk and poor access to input and output markets. For livestock improvement programs to be successful, these constraints must be recognized and addressed so that solutions can be integrated within a balanced holistic approach to improvement that responds both to the needs of producers and their markets. Governments should be made aware of the importance of genetic improvement and encouraged to create favorable conditions through economic incentives, the allocation of resources for applied research, training programs, etc.

Therefore, there is need to develop the existing stock of the farmers by providing the required inputs in order to make livestock sector more beneficial for the poor. Further, there is need for new policy paradigm. Presently, world over there is a shift away from sectoral development. Now livestock are not considered as production instruments. But livestock are looked in the context of vulnerability, in the context of water, in the context of nutrition. The issues of livestock--farmers cannot be confined to a particular sector. They cut across many sectors. Hence there is a need to have a holistic view and a collaborative effort to have a pro-poor, pro-environment development, which will produce an inclusive and sustainable growth.

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