

Livestock Farming For Sustainable Livelihoods Of Agrarian Tribes In South India: A Study In Kolli Hills Of Tamil Nadu

Dr. N. Kumar

Assistant Professor School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, India

Dr. Ilankadhir. M

Assistant Professor School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, India

Abstract

Due to poor productivity of the crop sector, decreasing availability of per capita arable land and lack of other income generating avenues, there is heavy dependence of tribal households on animal husbandry activities. It is expected that the livestock rearing offers substantial income to tribal people particularly during non-agricultural seasons, which can create an impact within the shortest period on the tribal economy. The livestock keeping generates a continuous stream of income and employment, which is an inevitable component of tribal development. The crop enterprise alone cannot help the tribal farmers for sustained survival and to increase their income and employment. A considerable scope exists to improve the economic status of the tribal through livestock enterprise, which provides a sufficient year round employment and income opportunities. At the same time cropping sectors will get inputs like pesticides, capital, power, etc. from the livestock sector. In this background, the study is conducted among tribal households of Kolli hills. Main objectives of the study are to understand the nature of crop husbandry and animal husbandry of the tribal households; to examine the income and employment generation of livestock farming in tribal areas; and assess the linkage effects of animal husbandry and crop husbandry towards sustainable tribal development. Kolli hills is located in Namakkal district of Tamilnadu. The necessary data for the study were collected from 170 tribal households. Data collected are analysed with the help of suitable statistical tools. Expected results would help in policy formulation for speeding the tribal development.

Key Words: Tribal, Livestock, Agriculture, Employment, Livelihood, Sustainability

1. INTRODUCTION

Livestock, an integral component of agriculture, makes multifaceted contributions to the growth and development of agricultural sector in India. They help to improve food security by providing nutrient-rich food products, generating income and employment in rural areas, and acting as a cushion against crop failure. They also provide draught power and manure inputs to the cropping sub-sector, and contribute to foreign exchange through exports of dairy products and meat. India is one of the largest countries in livestock population in the world and it is accounting for 57 per cent of world's buffalo and 16 per cent of world's cattle and rank first in respect of cattle and buffalo, third in sheep and second in goat population in the world. Livestock population in India has a positive growth trend over the years and as per 2012 Livestock Census in India, cattle is accounted 190.9 million, buffalo is 108.7 million, sheep is 65.07 million, goat is 135.17 million and pig is 10.29 million (FAOSTAT 2012; Indian livestock Census 2012).

The Problem

Due to poor productivity of the crop sector, decreasing availability of per capita arable land and lack of other income generating avenues, there is heavy dependence of tribal households on animal husbandry activities. It is expected that the livestock rearing offers substantial income to tribal people

particularly during non-agricultural seasons, which can create an impact within the shortest period on the tribal economy. The livestock keeping generates a continuous stream of income and employment, which is an inevitable component of tribal development. The crop enterprise alone cannot help the tribal farmers for sustained survival and to increase their income and employment. A considerable scope exists to improve the economic status of the tribal through livestock enterprise, which provides a sufficient year round employment and income opportunities. In this background, the study is conducted among tribal households of the Kolli Hills in Tamilnadu.

Research Objectives

Main objectives of the study are;

- ❖ To understand the nature of crop husbandry and animal husbandry of the tribal households;
- ❖ To examine the income and employment generation of livestock farming in tribal areas; and
- ❖ To assess the linkage effects of animal husbandry and crop husbandry towards sustainable tribal development.

Scope of the Study

The study focuses on the income pattern of tribal farmers, the employment potential of livestock farming, contribution of livestock rearing to the income of the tribal households, the factors influencing the livestock production and linkage effect between crop and animal husbandry in the study area. These will be useful for the planners and policy makers to suggest suitable recommendations for improving the living standard of tribal farmers through livestock farming. As this study also attempts to explore the constraints in livestock production, it will be helpful to suggest measures to overcome them in future and to improve the income and employment of tribal people through livestock farming.

2. MATERIALS AND METHODS

For the research, four village panchayats have been chosen among 14 villages panchayats in Kolli Hills block of Namakkal district and name of the village are; *Thiruppuli Nadu*, *Gundur Nadu*, *Alathur Nadu* and *Gundani Nadu*. In the first stage, these four villages are selected based on random sampling method and in the next stage, sample household are selected and classified into four categories namely Landless (LL), Marginal Farmers (MF), Small Farmers (SF) and Large Farmers (LF). Total sample households of the study are 340, which belong to various categories of tribal farmers from these four villages of Kolli Hills.

Table 1. Distribution of Sample Households According to Villages and Categories

(in Nos.)

Name of village	Landless (LL)	Marginal Farmers (MF)	Small Farmers (SF)	Large Farmers (LF)	Total
Thiruppuli Nadu	12	41	22	13	88 (26)
Gundur Nadu	16	69	31	15	131 (38)
Alathur Nadu	9	33	17	11	70 (21)
Gundani Nadu	7	20	15	9	51 (15)

Total	44	163	85	48	340 (100)
-------	----	-----	----	----	--------------

Source: Field survey

Note: 1. Figures in parentheses indicates percentage to column total

2. The source and note is common to all the tables in the present chapter

Sample Design

Out of the 340 sample households, nearly 65 per cent comes from upper elevated village panchayats viz. *Gundur Nadu* and *Thiruppuli Nadu* and the remaining 35 per cent of sample households comes from lower elevated village panchayats viz. *Alathur Nadu* and *Gundani Nadu*. Analysis also shows that large amount of sample households are from marginal farm category (49 %) and least amount of households are represented under landless category (13 %).

Data for the Study

The data for the study were collected by both primary and secondary methods with the help of a well-structured and pre-tested schedule, specially designed for the objectives specified in the study. The information regarding the size of the family, educational status, pattern of household employment, land holding details, cropping pattern, size and kind of livestock holding, system of rearing, management practices, production costs, risk management, income from livestock, agriculture and non-farm activities, household consumption, status of marketing, credit for livestock, animal health, linkage between livestock and crop husbandry and saving details were collected from each farmer. The farmers were also made to identify the constraints in livestock production faced by them.

Besides the data collected from the selected farmers, secondary data relating to human population, literacy rate, agro-climate conditions, rainfall, soil type, livestock population, veterinary institutions, crops and cropping pattern, etc. for the study area were collected from the local bodies, Block Development Offices, Census Reports, Assistant Director Office of Animal Husbandry, Assistant Director Office of Statistics, District Collectorate, Directorate of Economics and Statistics of Chennai, journals, electronic sources, and reports of research and non-governmental organizations. The secondary data collected from the different sources are cross-checked with adequate care.

Tools of Analysis

The data collected from primary and secondary sources are analyzed with the help of relevant techniques like bi-variate tabulation, percentages, averages (Conventional analysis), multiple linear regression analysis, forward and backward linkage technique and Garrett's Ranking technique. Tools are selected and used after assessing the nature of the primary data collected from the respondents.

3. ANALYSIS AND DISCUSSION

Management of Livestock Farming

Management of livestock is carried out in three different means: head of the household; head of the household and spouse of the head of the household; or head of the household and other household members. It is evident from the primary data that one-fifth of the households manage the livestock enterprise only through the head of the household. And in majority of the households (48 %), livestock enterprise is managed by both head of the household and their spouse jointly. In the remaining households (34 %), the livestock management is done by all the household members including head of the households. The data also reveals that a significant proportion of households from landless and marginal farm households manage the livestock through head of the households from small farm. At the same time the large farm households manage the livestock enterprise with all the members of the households. Table 2 gives details on employment opportunity of household members from various economic activities.

Table 2. Employment Opportunities from Different Enterprises

(in man-days, per household & per annum)

Category of farmers	Crop Enterprise			Livestock Enterprise		
	Male	Female	Total	Male	Female	Total
Landless	-	-	-	252	170	420
Marginal	105	127	233	336	69	405
Small	109	168	278	360	48	408
Large	205	319	525	273	111	384

Source: Field Survey.

Credit Facilities and Extension Activities in the Study Area

Financial assistance is one of important livelihood capital to start and expand any enterprise. Landless, small and marginal farmers are very poor in financial asset and that is why, most of the small and marginal farmers could not expand their livelihood activities into next level. The current part of the study examines the credit facilities and extension activities availed by the households.

Households receive loans from various financial institutions like Indian Bank, Large scale Multi-Purpose Society (LAMPS) and other private sources. Nearly 80 per cent of the households received financial assistance from one of the public sector banks, namely India Bank, followed by cooperative bank (LAMPS) (15 %) and other private sources (6 %). There are some degrees of variations that have been observed among households of different categories with respect to sources from which they receive financial assistance. The proportion of households which depend on nationalised bank varies negatively with farm size and it ranges between 68 % for large farm category and 84 per cent for landless category. At the same time, the proportion of households that depend on cooperative society varies directly with farm size of the households. It varies between zero % for landless households and 27 % for large farm households. There is no systematic relationship that has been observed between size of farm of the households and number of households obtained loans in the case of private sources. In short, a large proportion of the tribal household depends on nationalised bank for their financial needs. The national bank provides loans at a reasonable rate of interest, which varies between 4 per cent (for subsidised jewel loans) and 13 per cent (with collateral security for any purposes). The cooperative credit society provides loan at the rate of interest from zero percent (for conditioned subsidized crop loan) to 18 per cent (for other non-subsidized loans). However, only a few households accessed the loan from the cooperative society, because loan is the target based as well as issued only for a limited period of time in a year.

Survey data shows that majority of the households receive jewel loan (59 %) followed by agricultural loan from the financial institutions (34 %) and other type of loans (7%) from non-institutional sources. Aggregate average loan amount received from all sources varies largely between Rs. 2,000 for landless households and Rs. 35,476 for large farm households. Jewel loan is a major type of loan for landless and marginal farm households, whereas agricultural loan is a major type of loan for small and large farm households.

Most of the households receive loan for cropping (30 per cent) and educational (28 per cent) purposes. Other important purposes for which loan are received is family expenses (13 per cent), livestock purchase (11 per cent) and medical expenses (9 per cent). Loans are received for the purposes such as repayment of old debt. The inter-group variations exist among households on the purpose for which loans are received. A negative association appears between the size of land holding and the number of households who receive loan for family expenses; a similar kind of relationship exists for educational purpose also.

Willingness to Stay in Livestock Farming

A 54 per cent of the households are willing to continue the livestock enterprises in the future also. At the same time, different categories of households show differential levels of willingness to stay on this field. Most landless (57 per cent) and marginal farm households (66 per cent) show willingness to continue the livestock enterprise even though they have many hurdles in it. This is mainly because the livestock enterprise provides a reasonable size of income and continuous employment for these two categories of the households.

Reasons for Continuation of Livestock Farming

Reasons for the continuation of the livestock farming by the tribal households are analysed in this section. The main reasons reported by them are easy to manage the livestock in tribal area; it provides additional income for the households; it enhances the employment opportunity for the household members; it gives low-cost livestock products to households like meat, milk and manure; and it helps to receive subsidized loans. To collect data especially for this item, first the reasons have been listed to the respondents, and asked to converse on each reason for a minute or two. From their responses the level or degree of the reasons [measured with five point scale as strongly agree, agree (really reason for the continuation) neutral (undecided) disagree and strongly disagree (really not a reason for the continuation) are measured with at most care.

Table 3. Reasons for Continuation of Livestock Farming by Landless Households (in Nos.)

Reasons	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Easy to maintain livestock	8	21	6	7	2	44
Additional income through livestock rearing	21	17	4	2	-	44
Additional employment through livestock rearing	25	11	6	1	1	44
Availability of livestock products at low cost	11	20	5	5	3	44
Availability of Government loans and subsidies for livestock rearing	-	5	6	27	6	44

Source: Field Survey.

According to the households (without categorization), livestock enterprises are run continuously by them for the strong reasons like provision of additional income for the households (91 per cent), provision of continuous employment to the household members (91 per cent), convenient form of occupation for the tribal households (79 per cent) and provision of low-cost products for the households (77 per cent). However, getting subsidised loan for livestock enterprises is not a reason for continuous running of livestock enterprises.

Opinion on the Functioning of Veterinary Dispensary Officials

Government of Tamil Nadu provides medical, reproductive, advisory, awareness creation and other services like exposure visits, for the livestock development, through its Animal Husbandry Department. For these purposes, the government runs Veterinary Hospitals at district level and Veterinary Dispensaries at (major) villages. There are two such dispensaries functioning in Kolli Hills. Treatment and medicines for livestock are given at free of cost. These dispensaries are functioning with a doctor, a livestock inspector and an assistant. It is the routine duty of the doctor, livestock inspector and assistant to provide necessary services to needy households with livestock. Since the villages in the study area are located in hilly region, according to some of the households, these officials are reluctant to visit hospital and discharge their duty.

Twenty-one per cent of the households with livestock enterprise have made such complaints. But, majority of the households (79 per cent) have satisfaction over the functioning of the officials in veterinary dispensaries in this area.

Opinion on the Functioning of Veterinary Dispensary Officials

Government of Tamil Nadu provides medical, reproductive, advisory, awareness creation and other services like exposure visits, for the livestock development, through its Animal Husbandry Department. For these purposes, the government runs Veterinary Hospitals at district level and Veterinary Dispensaries at (major) villages. There are two such dispensaries functioning in Kolli Hills. Treatment and medicines for livestock are given at free of cost. These dispensaries are functioning with a doctor, a livestock inspector and an assistant. It is the routine duty of the doctor, livestock inspector and assistant to provide necessary services to needy households with livestock. Since the villages in the study area are located in hilly region, according to some of the households, these officials are reluctant to visit hospital and discharge their duty.

Twenty-one per cent of the households with livestock enterprise have made such complaints. But, majority of the households (79 per cent) have satisfaction over the functioning of the officials in veterinary dispensaries in this area.

Awareness on Livestock Insurance

The livestock insurance scheme has emerged as a saviour over the years for landless, marginal, small and large farmers, and for those whose major occupation is domestic animal rearing. Purchase of livestock is very expensive, and thus carries higher risk exposure. Any disease, accident or theft leads to significant loss to the households. In this reason, livestock insurance was initiated in India through the Small Farmers' Development Agency (SFDA) in year 1971.

From the data it is understood that only 5 per cent of households alone have awareness on livestock insurance and have brought their livestock under the insurance scheme. The other households are not aware on such insurance to mitigate the risk and uncertainty in the livestock rearing.

Source of Buying of Livestock

All the households do not get livestock from their own breeding (except poultry). Most of the households get livestock from other sources like buying from local markets (Kolli Hills and surrounding areas), friends and relatives and nearby towns (mainly from *Namakkal* and *Puthan Santhai*).

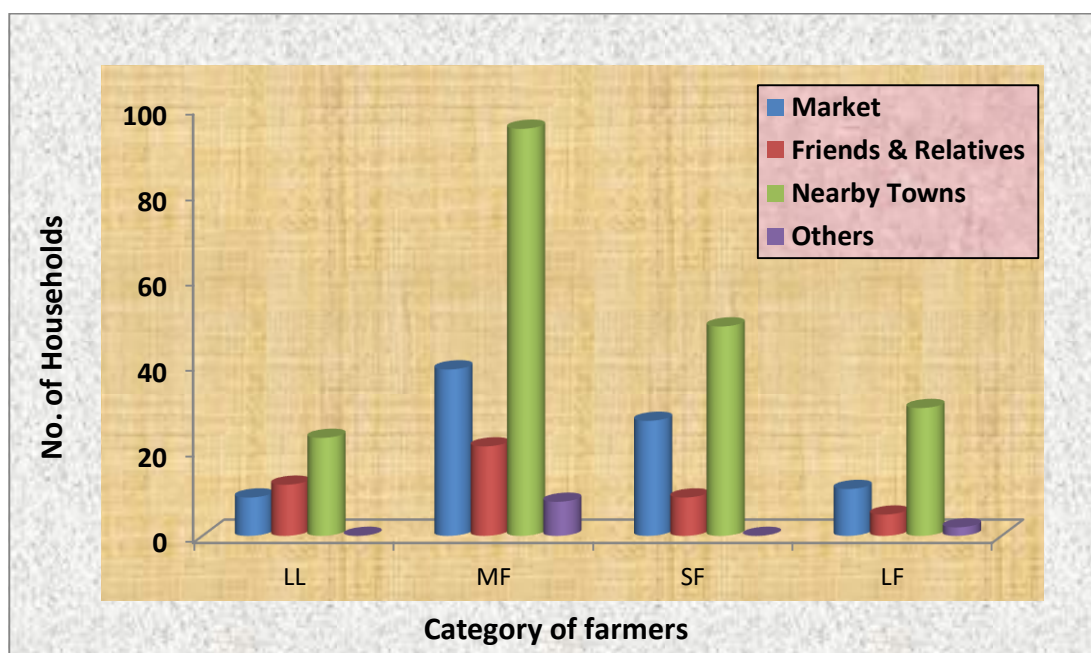


Figure 1. Source of Purchase of Livestock

India's animal wealth is quite large in terms of its populations. The source of information provides facilities of sale /purchase information on all kinds of animals, such as, cattle, buffalo, sheep, goat, pigs, poultry, horse, camel, pet animals like dog, cat and other exotic animals. It enables the seller and buyers to have a wider choice so that it enables to eliminate the middlemen who actually make major profit in such dealings. It may also offer an opportunity to new livestock entrepreneurs to select quality animals from trusted sources. The following table portrays the information of purchase of livestock in the study area.

Field data shows that households make intermittent sales of animals mainly due to meet the family expenditure (42 per cent), aging of livestock (35 per cent), manpower shortage in relation to increase in size of livestock enterprise in due course (27 per cent) and diseased animals (16 per cent). It is also observed there are inter-group differences among the households with respect to reasons for sale of livestock. Family expenditure is the major reason (55 per cent altogether) for landless and marginal farm households for sale of livestock, because they largely rely on this enterprise for their source of income. Manpower shortage and aging livestock are the major reason for small and large farm households (60 per cent altogether). Manpower shortage is not at all the reason for intermittent sale of livestock for the landless households.

Cost and Return from Livestock Farming

Following are the main findings arrived with regard to cost returns from livestock farming among the sample farmers of the Kolli Hills.

1. Costs of livestock are categorised into two; Fixed Cost [that conveys depreciation on building (10%) and interest on investment (10 %) on animal purchase, and variable cost (that includes dry fodder, concentrate, medicine cost and miscellaneous cost). Finally, returns of livestock

farming comprise sale of animals and eggs (calf, goat, pig, and bird), value of milk, value of draught power and manure of all animals and birds.

2. The analysis shows that marginal and large farmers have invested a huge amount in livestock rearing (Rs. 47,736 and Rs. 44,894 respectively) than landless and small farmers (Rs. 30,523 and Rs. 37,329 respectively). Fixed cost worked out for the large farmers (Rs.6,597) is higher than the cost for the marginal farmers (Rs. 6,179), small farmers (Rs. 4,966) and landless households (Rs. 4,005). The study indicates that in the case of variable cost, same pattern prevail as in the case of fixed cost. Large farmers spend more (Rs. 3,963) than marginal farmers (Rs. 3,220) and small farmers (Rs. 2,770) and landless households (Rs. 2,168). Landless households earn poor net returns (Rs. 3,790) than other households. Large farmers get more net income (Rs.7,891) than marginal farmers (Rs. 5,858) and small farmers (Rs. 4,163). Overall Cost benefit ratio from livestock farming is 1.64. It clearly indicates that livestock farming is economically viable for the tribal households.
3. The bottom 55 per cent of the landless households earns about 40 per cent of their income from livestock farming, while the top 14 per cent of these households earns 21 per cent of the income from same farming system. In case of marginal farm households, bottom 51 per cent the farm households earns 31 per cent of the income, while the top two per cent of these households earns just three per cent of the income. It indicates that there is a smooth sharing of income among this category of households. It indicates that the bottom 53 per cent of the small farm households earns 33 per cent of the income, while the top four per cent of these households earns ten per cent of the income. It is concluded that income distribution for is such that higher income group of these households earn almost ten per cent of the income. About 47 per cent of the respondents come under the middle income group and they receive 57 per cent of the income. In case of large farm households, the bottom 65 per cent of the farm households earns 51 per cent of the income, while the top 10 per cent of these households earn eighteen per cent of the income. It is concluded that income distribution is very close to equality curve. Higher income group of these respondents are earning more than one fifth of the income.
4. Multiple regression analysis helps to understand the factors influencing milk production of dairy farming. The co-efficient of multiple determinations (R^2) is 0.637, which indicates that the variables included in the analysis shows roughly 64 per cent variation in total milk production. Among the variables, number of cow is significant at 1 % level and dry fodder cost and medicine cost are significant at 5 % level. This study also illustrates that the number of cow is one important factor which determine the milk production. This finding coincides with the result obtained by Sharma and Singh (1993), Singh *et al.* (1998) and Singh (2000). The variables like depreciation on livestock shed, interest on investment, miscellaneous cost, and educational qualification of the respondents are not significant in influencing milk production.

Linkage between Livestock and Crop Husbandry

Crop and livestock farming complement each other. Half of the world's food comes from farms that raise both. Animals pull ploughs and carts, and their manure fertilizes crops, which supply post-harvest residues to livestock. The quest for 'intensification' in livestock farming has thundered ahead with little regard for sustainability and overall efficiency. With animal protein set to remain part of the food supply, we must pursue sustainable intensification and figure out how to keep livestock in ways that work best for individuals, communities and the planet. The following table enlightens about households' opinion on use of inputs from animal husbandry and crop husbandry.

Table 4. Opinion on Transaction of Inputs between Animal Husbandry and Crop Husbandry

(in Nos.)

Opinion	MF	SF	LF	Total
Yes	82 (100.0)	42 (100.0)	24 (100.0)	148 (100.00)

All the land-owning households are of the opinion that output of livestock enterprise is input of crop enterprise and vice versa. Livestock enterprise outputs like manure and drought power are used as input in crop enterprise; similarly, output of crop enterprise like crop residues and green fodder are used as input in livestock enterprise.

Mutual Inter-Dependence

Table 5 presents the mutual inter-dependence of livestock and crop husbandry. It includes plough, manure and crop harvesting and process; manure and drought power; and green fodder and paddy straw.

Table 5: Mutual Inter-Dependence of Livestock and Crop Husbandry

(in Nos.)

Mutual Usage	MF	SF	LF	Total
Livestock Husbandry to Crop Husbandry – Backward Linkage				
Plough + Manure + Harvesting process	82	42	24	148
Manure + Drought power	82	42	24	148
Crop Husbandry to Livestock Husbandry – Forward Linkage				
Green fodder + Paddy straw	82	42	24	148
Total	82	42	24	148

Entire land owning households are using output of one enterprise as input the other enterprise. Farmers use livestock for ploughing, manure and harvesting activities. At the same time, they use crop enterprise's output such as green fodder, dry fodder and paddy straw to the livestock enterprise.

Linkage between Livestock and Crop Husbandry

1. Crop and livestock farming complement each other. Half of the world's food comes from farms that raise both. Animals pull ploughs and carts, and their manure fertilizes crops, which supply post-harvest residues to livestock. The quest for 'intensification' in livestock farming has thundered ahead with little regard for sustainability and overall efficiency.
2. All the land-owning households have the opinion that output of livestock enterprise is input of crop enterprise and vice versa. Livestock enterprise's outputs like manure and drought power are used as input in the crop enterprise; similarly, output of crop enterprise like crop residues and green fodder are used as input of livestock enterprise.
3. Mutual Inter-dependence: It includes plough, manure and crop harvesting and process; manure and drought power; and green fodder and paddy straw. Entire land owning households are using output of one enterprise as input for other enterprise. Farmers use livestock for ploughing, manure and harvesting activities. At the same time, they use output

of crop enterprise such as green fodder, dry fodder and paddy straw for the livestock enterprise. It shows that there is a strong forward and backward linkages between crop husbandry and animal husbandry.

4. Method of Land Preparation for Crop Cultivation: Fifty to 70 per cent of the lands owning households utilize cattle alone for the land preparation; and remaining 46 per cent of the households use both cattle and machine power like tractor. This shows that cattle (bull and bullock) are the most important resources for land preparation in the study area.
5. Forms of Manure: Farmers of developing countries traditionally use organic inputs for agriculture. Even after the introduction of modern agriculture, most of the marginal and small land holders of these countries use a sizeable amount of organic inputs like farm yard manure, many natural pesticides and weedicides derived from livestock enterprises. It is evident from the study that all the households use fully composted manure for their crop cultivation. None of the households use any other form of manure.

4. SUGGESTIONS

The policy implications that are more appropriate for making improvement in the backward condition of the tribal groups are listed below.

- ❖ The study indicates that cattle and goat provide more income; priority may be given on these farming practices. To boost up their production, policy makers should take efforts to ensure the availability of high performing local and improved breeds of animals, so as to ensure viable livestock farming to poor tribal farm families.
- ❖ In case of fodder production in the tribal area, tribal farm families should be encouraged to allocate land for suitable fodder cultivation, besides initiating concerted efforts to improve the productivity of such livestock.
- ❖ Since, lack of marketing facilities is felt as the main constraint in the case of dairy by the tribal farmers in the study area, the concerned authorities may be suggested to establish more milk co-operative societies with genuine quality checking instruments, cooling storage for procuring the milk produced by tribal farmers.
- ❖ Lack of adequate credit facilities is the foremost problem in livestock farming in the study area. Hence concerned efforts may be taken by financial/co-operative institutions to provide loans for buying animals and construction of proper sheds to the needy farmers.
- ❖ Since, inadequate knowledge about the improved techniques of livestock farming is also the problem in tribal households, it is important to make them aware and motivate them about scientific feeding of concentrates effectively through intensive extension programmes on animal husbandry, by means of demonstration and field trips.
- ❖ Since the livestock sector provides a stable income and year round employment compared to non-farm and agriculture, measures may be initiated to involve this weaker group more actively in livestock farming, while framing the policies and strategies for any tribal development programme in the state.
- ❖ In order to ameliorate the productivity level of the existing livestock resources of the tribal households, steps should be initiated to provide the facilities such as health care, provision of technical helps and facilities for improving the breed of the animals at a reasonable cost.

- ❖ Lack of transport facilities is another important problem in livestock and agriculture farming in the study area. Concerned authorities should establish proper and adequate transport facilities for easy marketing of livestock and farm produces.
- ❖ The study indicates that tribal households get additional income from milk production; the concerned authorities may be suggested to organize Farmers Producer Company for dairy farming. So that the farmers may be able to get substantial income without any struggles.
- ❖ Finally, the study clearly shows that as livestock farming is an available enterprise that provides income and employment for tribal farm families, which implies the need for the state and central government to establish the research and extension centers like Krishi Vigyan Kendra (KVK), livestock based research and demonstrations centers in the study area that is required to motivate the tribal farmers to take up livestock farming as a primary occupation.

5. CONCLUSION

The present study implies that livestock, agriculture and non-farm have a significant contribution to the income and employment of the tribal households. Livestock safeguards the tribal families, even at the time of any crop failures. Livestock enterprise offers adequate and continues employment opportunities when compared to agriculture and non-farming sectors. There is a good forward and backward linkage between agriculture and livestock sectors that ensure the traditional organic farming, reducing external inputs and fewer amounts spent on feed for livestock. Thus the livestock enterprise makes a substantial contribution to the tribal economy by improving standard of living and it plays a major role in alleviation of poverty in tribal areas. Strengthening of forward and backward linkages is essential to achieve alternative models of agriculture like integrated farming, organic farming, sustainable farming, and precision farming. To minimize the problems of livestock enterprises, immediate attention is needed in the areas of improved sheltering for animals, allotment of pasture lands, provision of relevant and reliable credit facilities, improved marketing and transport practices, good level of health and extension services for livestock through government and non-government agencies.

REFERENCES

1. Bhati, J.P., R. Singh and L.R. Sharma. (1996). Income and employment opportunities in tribal areas of Himachal Pradesh : Present status and challenges for development. *Artha – Vikas : Journal of Economic Development*, 32 (1): pp 42 -53
2. Chakraverty, M.L., Singh, J.P. and Atibudhi, H.N. (2010), “Economic Analysis of employment, income and consumption pattern of tribal farmers”, *Journal of Rural Development*, 8(1): pp 97 – 108
3. Das Singh, R.N. and Chakraverty, M.L. (2011), “Factors influencing milk production : A study in Khura district (Orissa)”, *Indian Journal of Agricultural Economics*, 50(3): pp 33 -39.
4. Food and Agricultural Organizations (2012): *FAOSTAT*. <http://www.fao.org/faostat/en/#data>, date of access: 31.12.2017
5. Govt. of India, Ministry of Agriculture, Department of Animal Husbandry (2012): 19th Livestock Census -2012 – All India Report [dahd.nic.in/sites/default/files/ Livestock%20% 205, pdf](http://dahd.nic.in/sites/default/files/Livestock%20%205.pdf), date of access 31.12.2017.
6. Sharma V P and Singh R V (1993): Resource productivity and associated efficiency in milk production in Himachal Pradesh. *Indian Journal of Agricultural Economics*, 48(2): pp 201-205.

7. Singh N K, Singh R V and Singh R P (1998): Livestock status and potentialities of increasing income and employment under mixed farming system. *The Bihar Journal of Agricultural Marketing*, 6 (4): 417 – 424.
8. Suryawanshi, S.D. (1992). A Study on employment, income and household economy of tribals in Western Ghat zone of Maharashtra. *Indian Journal of Agricultural Economics*, 47(3): pp 427 – 428.
9. Yang, W.Y. (2011), “Methods of farm management investigation for improving farm productivity”, FAO, Rome, pp 63 – 69.