

The Role of Bovine and Non bovine Livestock in Sustainable Rural Livelihoods in the Era of Climate Change: Macro Level Evidence from Secondary Data in India

K. Saranya¹, Dr.A. Kannan²

¹Research Scholar, Department of Environmental Economics, School of Economics, Madurai Kamaraj University.

²Assistant Professor Department of Environmental Economics, School of Economics, Madurai Kamaraj University, Madurai

Abstract- Livestock plays a important role in sustaining rural livelihoods by creating job, raising household income, and lowering poverty, livestock significantly contributes to the sustainability of rural communities. In India, rural households receive financial assistance from both bovine (cattle and buffaloes) and non-bovine (goats, sheep, poultry, and pigs) livestock; however, the relative contributions of these livestock varies by location and production method. This study looks at how livestock, both bovine and non-bovine, support sustainable rural livelihoods in India. The study is based exclusively on secondary data collected from the Livestock Census, reports of the Department of Animal Husbandry, NABARD publications, government statistics, and relevant research literature. In order to achieve sustainable rural development, it examines the economic relevance of various livestock categories and how they contribute to household income, employment creation, and the alleviation of rural poverty. The paper also analyses the need for policy measures to support livestock-based livelihoods through enhance infrastructure, veterinary services, financial assistance, and market access. The results are anticipated to give policy insights for fostering equitable and sustainable rural development in livestock-dependent areas as well as a helpful basis for further empirical study.

Keywords- Bovine livestock, non-bovine livestock, Rural livelihoods, Household income, Sustainable development, Secondary data, India.

I. Introduction

Agriculture and allied activities comprise the major portion of the Indian rural economy. Out of the various allied activities, livestock is of great significance. Livestock rearing has been taking place since ages and is a dependable source of income and employment as well as food security for the rural people. The livestock sector plays a very important role in the agricultural economy of the country as it provides an assured income as well as acts as a safety net against agricultural risks and market fluctuations (Department of Animal Husbandry & Dairying, 2023).

India has one of the largest livestock populations in the world. According to the livestock census, India ranks high in the number of cattle, buffaloes, goats, sheep, and poultry birds. The livestock contributes 4.11 percent to the gross domestic product (GDP) and 25.6 percent to the agricultural gross value added (National Accounts Statistics, 2024; Department of Animal Husbandry & Dairying, 2023). Livestock farming provides employment to millions of people in rural India. Small and marginal

farmers, landless labourers, and women are some of the major beneficiaries of livestock farming (NABARD, 2023).

The livestock can be broadly classified into bovine and non-bovine. Bovine livestock includes cattle and buffaloes and non-bovine livestock includes goats, sheep, poultry, pigs, and other small animals. The bovine animals are reared for milk, draught power, and manure. Non-bovine livestock is reared for meat, eggs, wool, and other products. Bovine livestock provides a regular and assured source of income to the farmers while non-bovine livestock provides quick returns on investment with low risk and less capital investment (Birthal & Negi, 2012).

Sustainable rural livelihoods can be defined as livelihoods that are likely to enhance or maintain the well-being of rural people and communities by increasing their capacity for economic self-sufficiency and environmental sustainability (Chambers & Conway, 1992). Livestock rearing plays a very important role in promoting sustainable rural livelihoods. It provides employment and income to people as well as food security. The income from livestock helps in maintaining the consumption levels of the people and also helps in saving and investment, thereby promoting sustainable rural livelihoods (FAO, 2023; Singh et al., 2020).

Hence, the purpose of this study is to evaluate the role of bovine and non-bovine livestock in India and discuss policy recommendations for future rural livelihood and economic development based on the data retrieved.

This study aims to focus on the role of bovine and non-bovine livestock in promoting sustainable rural livelihood in India. The paper will utilize secondary data regarding the impact of livestock on rural employment, income, and overall development for the evaluation and analysis of the issue. Moreover, the paper will provide recommendations for policy improvement based on the findings.

Statement of the Problem

Livestock farming plays a crucial role in providing income, employment, food security, and overall livelihood support to rural households across India, especially for small and marginal farmers. Despite its significance, the sector contends with several constraints, including low productivity, insufficient veterinary care, limited access to credit, shortages of animal feed, increasing input costs, unstable market prices, and risks associated with climate change. While there is substantial research on livestock development, less focus has been placed on comparing the contributions of bovine and non-bovine animals to rural livelihoods. This study aims to address that gap by analyzing the roles these two categories of livestock play in generating employment, improving incomes, and alleviating poverty in India, using existing secondary data.

Objectives of the Study

1. To study the role of bovine and non-bovine livestock in sustainable rural development in the India.
2. To analyse the contribution of livestock animals towards socio-economic status, income level, and employment.
3. To recommend strategies for sustainable livestock-based livelihood for the promotion of rural development in India.

III. Research Methodology

Research Design

The current research work has adopted the descriptive and analytical research design to study the role of bovine and non-bovine livestock in promoting sustainable rural livelihoods in India.

Sources of Data

The secondary data has been collected for the current research work from reports of NSSO (National Sample Survey Organisation) 572, 20th livestock census, Basic animal husbandry statistics, Department of Animal Husbandry and Animal Husbandry reports, NABARD reports, Government publications, and research journals.

IV. Review of Literature

Biradar, N., et.al., (2013) examined the study of “Assessing Contribution of Livestock to the Livelihood of Farmers of Western Maharashtra.” The study was conducted in Satara district of Maharashtra using primary data collected from 100 sample farmers selected from five taluks. The study explored the contribution of livestock to farmers livelihood in terms of income, nutrition, employment, manure production, risk management, and social status. The results of the study revealed that livestock contributes 18.60 to 33.90 percent to the total income of the household, provides employment to a large number of people, serves as a source of rich nutrients and provides farmyard manure for crop production. The study concluded that livestock plays a significant economic and social role in improving rural livelihoods and sustainable development.

Roland-Holst, D. and Otte, J. (2006) analysed the study explores how livestock contributes to and influences household livelihoods through empirical analysis using poverty and livestock development indicators from Senegal, a West African economy. The result shows that livestock dependent households faced a higher risk of poverty despite the fact that livestock is important source for income and security. The study also revealed that, due to the limited market connections the smallholder producers received only a small share of the final market value of livestock products. The authors came to the conclusion that livestock has a great deal of potential to alleviate poverty as long as specific policies enhance rural people's access to markets, productivity, and income prospects.

Pandey, A.K (2024) the study analysis of Poverty indices in relation to Income from livestock and crop production among farming households in Mirzapur District of Uttar Pradesh. This study used various poverty indices such as Headcount Ratio, Poverty gap Ratio, and Income gap Ratio. Primary data were collected from 400 Households. The study emphasize household with Livestock earn 21% income from livestock and 73% from crops. Household without livestock generate 89% income from crops alone. The poverty indices were significantly lower for household comparatively those without livestock, indicating that livestock ownership helps to reduce poverty severity. The study suggests generating sustainable livestock production and promoting livestock support system to reduce poverty among small and marginal farmers. Establishing

access to subsidies, superior livestock breeds and livestock expanding programs can promote rural income and employment.

Pica-ciamarra,U., et.al (2011) shows that livestock assets, livestock income, and rural households: cross-country data from household surveys in twelve developing nations. The study sought to analyse livestock ownership and its role in contributing to rural household income, utilizing the FAO RIGA household survey database. According to the survey, households with lower incomes were frequently more likely to possess animals, while livestock ownership was prevalent across all income levels. 12% of household income is typically derived from cattle, though this percentage varies by nation. The study suggest that livestock is a prominent source of livelihood, income generation, and poverty alleviation and recommended nations specific livestock enhancement policies focusing on small ruminants and poultry.

V. Results and Discussion

Table -1 Total Bovine population (in million numbers) in India

Year	Cattle	Adult Female Cattle	Buffalo	Adult Female Buffalo	Total Bovine
1951	155 (56.74)	54 (19.88)	43 (15.71)	21 (7.67)	274
1956	159 (58.20)	47 (17.24)	45 (16.50)	22 (8.07)	273
1961	176 (58.22)	51 (16.91)	51 (16.91)	24 (7.96)	302
1966	176 (57.58)	52 (16.93)	53 (17.32)	25 (8.17)	306
1972	178 (56.19)	53 (16.70)	57 (17.96)	29 (9.14)	317
1977	180 (55.05)	54 (16.51)	62 (18.96)	31 (9.48)	327
1982	192 (54.24)	59 (16.67)	70 (19.77)	33 (9.32)	354
1987	200 (53.01)	62 (16.46)	76 (20.18)	39 (10.35)	377
1992	205 (51.59)	64 (16.14)	84 (21.18)	44 (11.09)	397
1997	199 (49.74)	64 (16.00)	90 (22.51)	47 (11.75)	400
2003	185 (46.45)	65 (16.18)	98 (24.58)	51 (12.79)	399
2007	199 (46.06)	73 (16.90)	105 (24.31)	55 (12.73)	432
2012	191 (44.03)	77 (17.16)	109 (25.07)	57 (13.15)	434
2019	193 (43.91)	81 (18.48)	110 (25.07)	55 (12.55)	438

Source: Livestock Census, MoFAHD, DAHD, GoI

According to Table 1, the overall bovine population increased from 274 million in 1951 to 438 million in 2019. The number of cattle grew from 155 million to 193 million, while buffalo numbers climbed more sharply, from 43 million to 110 million. Over this period, cattle's share of the total declined from 56.74% to 43.91%, while buffaloes' share increased from 15.71% to 25.07%. The rise in adult female cattle and buffaloes suggests a growing emphasis on dairy production within India's livestock sector.

Table -2 Total Non-Bovine population (in million numbers) in India

year	Sheep	Goat	Horse& Ponies	Camels	Pigs	Mules	Donkeys	Yark	Mithun	Total Non-Bovine
1951	39 (41.53)	47 (50.05)	1.50 (1.60)	1.00 (1.06)	4 (4.26)	.10 (.11)	1.30 (1.38)	NC	NA	94
1956	39 (38.01)	55 (53.61)	1.50 (1.46)	1.00 (.97)	5 (4.87)	.00 (.00)	1.10 (1.07)	NC	NA	103
1961	40 (36.53)	61 (55.71)	1.30 (1.19)	1.00 (.91)	5 (4.57)	.10 (.09)	1.10 (1.00)	.00 (.00)	NA	109
1966	42 (33.90)	65 (56.42)	1.10 (.96)	1.00 (.87)	5 (4.34)	.00 (.00)	1.10 (.95)	.00 (.00)	NA	115
1972	40 (31.98)	68 (57.63)	.90 (.76)	1.00 (.85)	7 (5.93)	.10 (.08)	1.00 (.85)	.00 (.00)	NA	118
1977	41 (31.21)	76 (59.28)	1.00 (.78)	1.00 (.78)	8 (6.24)	.10 (.08)	1.00 (.78)	.10 (.08)	NA	128
1982	49 (27.06)	95 (60.51)	.80 (.51)	1.00 (.64)	10 (6.37)	.10 (.06)	1.00 (.64)	.10 (.06)	NA	157
1987	46 (27.95)	110 (64.71)	.80 (.47)	1.00 (.59)	11 (6.47)	.20 (.12)	1.00 (.59)	.00 (.00)	NA	170
1992	51 (29.38)	115 (63.01)	1.00 (.55)	1.00 (.55)	13 (7.12)	.20 (.11)	1.00 (.55)	.10 (.05)	.20 (.11)	182
1997	58 (30.53)	123 (62.31)	1.00 (.51)	1.00 (.51)	13 (6.59)	.20 (.10)	.90 (.46)	.10 (.05)	.20 (.10)	197
2003	62 (31.79)	124 (61.05)	.80 (.39)	1.00 (.49)	14 (6.89)	.20 (.10)	.70 (.34)	.10 (.05)	.30 (.15)	203
2007	72 (31.79)	141 (62.25)	.60 (.26)	1.00 (.44)	11 (4.86)	.10 (.04)	.40 (.18)	.10 (.04)	.30 (.13)	227
2012	65 (30.67)	135 (63.71)	.60 (.28)	.40 (.19)	10 (4.72)	.20 (.09)	.30 (.14)	.10 (.05)	.30 (.14)	212
2019	74 (31.72)	149 (63.87)	.30 (.13)	.30 (.13)	9 (3.86)	.10 (.04)	.10 (.04)	.10 (.04)	.40 (.07)	233

Source: Livestock Census, MoFAHD, DAHD, GoI

The above table represents the population of non-bovine livestock rose from 94 million in 1951 to 233 million by 2019. Goats continued to be the most prevalent type, with their proportion growing from 50.05% to 63.87%. Over the same period, sheep numbers climbed from 39 million to 74 million. The significant expansion in goat and sheep populations underscores their growing role in supporting rural incomes, employment opportunities, and overall livelihoods.

Table-3 Comparative Growth of Bovine and Non-Bovine Livestock (1951–2019)

Category	1951 (Million)	2019 (Million)	Absolute Increase (Million)	Overall Growth (%)
Bovine Livestock	274	438	164	60
Non-Bovine Livestock	94	233	139	147.77

Source: Livestock Census, MoFAHD, DAHD, GoI

Table 3 compares the growth of bovine and non-bovine livestock populations in India between 1951 and 2019. The bovine population grew by 164 million, or 60%, rising from 274 million in 1951 to 438 million in 2019. Over the same period, non-bovine livestock increased by 139 million, a rise of 147.77%, from 94 million to 233 million. While bovine numbers remained higher overall, the significantly faster growth rate of non-bovine livestock highlights its growing role in diversifying rural livelihoods.

Table 4: Linear Trend Analysis of Bovine and Non-Bovine livestock in India

Bovine and non-bovine livestock	R value	R ²	Std. error of co-efficient	Level of Significant
Cattle	.789	.622	9.618	.001
Adult female cattle	.940	.883	3.657	.000
Buffalo	.991	.982	3.375	.000
Adult female buffalo	.983	.967	2.507	.000
Sheep	.935	.874	4.659	.000
Goat	.985	.971	6.230	.000
Horse and Ponies	.909	.827	.14670	.000
Camel	.613	.376	.19481	.020
Pig	.778	.606	2.182	.001
Mules	.589	.347	.05879	.027
Donkey	.894	.798	.16362	.000
Yark	.788	.621	.03292	.001
Mithun	.897	.804	.07035	.000

Source: Livestock Census, MoFAHD, DAHD, GoI

Table 4 reveals that most of the bovine and non-bovine livestock populations have a significant increasing trend across the years. Buffaloes ($R^2 = 0.982$), adult female buffaloes ($R^2 = 0.967$), and goats ($R^2 = 0.971$) were found to have the highest growth trends. Similarly, the population of sheep and adult cattle also increased significantly. Since all the significance values were found to be less than 0.05, the results were considered statistically significant. It can be concluded that buffaloes, goats, and sheep play a major role in livestock development and rural livelihood in India.

VI. Major Findings

The study revealed that India's bovine livestock population rose from 274 million in 1951 to 438 million by 2019, while non-bovine livestock grew from 94 million to 233 million over the same period. Non-bovine livestock showed a significantly higher growth rate of 147.77%, compared to 60% for bovine animals. Among non-bovine categories, goats were the most numerous, increasing from 47 million to 149 million. Buffaloes, adult female buffaloes, and goats exhibited the most consistent upward trends, with R^2 values of 0.982, 0.967, and 0.971, respectively. Overall, both bovine and non-bovine livestock play important roles in supporting rural income, employment, food security, and diverse livelihoods across India.

Suggestions

Based on the analysis, it is evident that greater governmental attention should be directed toward animal husbandry. This includes fostering favourable conditions for breeding and ensuring access to high-quality livestock breeds. Relevant authorities should also strengthen veterinary services and improve access to credit for livestock owners. Special emphasis ought to be placed on goat and sheep farming, which holds significant potential for development and supports the livelihoods of many small and marginal farmers. Furthermore, setting up effective market systems and extension services would provide essential support to farmers, helping boost both livestock numbers and productivity.

VII. Conclusion

The present study aimed to establish the contribution of bovine and non-bovine livestock to sustainable rural livelihood using secondary data from livestock census and government publications as the basis of research. As the study results demonstrate, both bovine and non-bovine livestock witnessed a substantial increase over the analyzed period. Whereas the number of cattle and buffaloes accounted for the main sources of income for many rural residents, the rise in goats and sheep numbers resulted in the prosperity of marginal farmers and the national economy. buffaloes, goats, sheep growth rates are notable since they address food security, rural income, and climate change concerns regarding the potential threats that agricultural activities bring. Thus, the paper concludes with recommendations for improved breed, credit, and marketing policies for bovine and non-bovine livestock. In general, both cattle and non-cattle agricultural animals may address the concerns of promoting sustainable rural livelihood.

References

1. Biradar, N., Desai, M., Manjunath, L., & Doddamani, M. T. (2013). Assessing Contribution of Livestock to the Livelihood of Farmers of Western Maharashtra. *Journal of Human Ecology*, 41(2), 107–112. ISSN: 0970-9274.DOI: 10.31901/24566608.2013/41.2.02.
2. Roland-Holst, D., & Otte, J. (2006). *Livestock and Livelihoods: Development Goals and Indicators Applied to Senegal*. Pro-Poor Livestock Policy Initiative

- (PPLPI) Research Report No. 06-08, Food and Agriculture Organization (FAO), Rome.
3. Government of India. (2019). 20th Livestock Census 2019. Department of Animal Husbandry and Dairying, Ministry of Fisheries, Animal Husbandry and Dairying, New Delhi.
 4. NABARD. (2023). Status of Livestock Sector in India. National Bank for Agriculture and Rural Development, Mumbai.
 5. Pandey, A. K. (2024). Exploring Livestock and Agricultural Income Poverty among Farming Households: Study Based on Mirzapur District of Uttar Pradesh. Indian Journal of Agricultural Economics, 79(3), 535–546. Publisher: Indian Society of Agricultural Economics. ISSN: 0019-5014. DOI: 10.63040/25827510.2024.03.014.
 6. Birthal, P. S., & Negi, D. S. (2012). Livestock for Higher, Sustainable and Inclusive Agricultural Growth. Economic and Political Weekly. ISSN: 0012-9976
 7. Pica-Ciamarra, U., et.al (2011). Livestock Assets, Livestock Income and Rural Households: Cross-country Evidence from Household Surveys. ESA Working Paper No. 11-17. Agricultural Development Economics Division, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Publisher: FAO. July 2011.
 8. Basic Animal Husbandry Statistics. (2024). Department of Animal Husbandry and Dairying, Government of India, New Delhi.
 9. National Sample Survey Office (NSSO). (2014). Key Indicators of Situation Assessment Survey of Agricultural Households in India (NSS Report No. 572). Ministry of Statistics and Programme Implementation, Government of India.