

# An Economic Study of Goat Farming and Its Impact on Beneficiaries in Rewa District, Madhya Pradesh

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**Abstract:** Goat farming constitutes one of the most significant components of the rural livestock economy in Madhya Pradesh. The present study examines the economic impact of goat rearing on beneficiaries in Rewa district of Madhya Pradesh, India, with a view to assessing income generation, employment creation, and overall livelihood improvement. Primary data were collected from 120 purposively selected goat farmers across six development blocks of Rewa district during 2023-24. The study employs cost-benefit analysis, farm income analysis, and regression modeling to evaluate economic outcomes. Results indicate that goat farming generates a mean annual net income of ₹38,420 per household, with a benefit-cost ratio of 1.68. The activity provides approximately 182 man-days of employment per annum per household. Marginal and small farmers, women-headed households, and Scheduled Caste/Scheduled Tribe (SC/ST) communities emerge as the primary beneficiaries. Constraints such as inadequate veterinary services, non-availability of quality breeds, poor market linkage, and limited institutional credit inhibit the full realization of the sector's potential. Policy interventions targeted at breed improvement, veterinary infrastructure, market development, and enhanced credit access are recommended to strengthen the viability of goat farming as a poverty-alleviating enterprise in Rewa district.

**Keywords:** Goat farming, Economic impact, Rewa district, Benefit-cost ratio, Livelihood, Small ruminants, Rural income

## 1. Introduction

India possesses one of the largest goat populations globally, serving as a critical cornerstone for the nation's agrarian economy. According to the 20th National Livestock Census (2019), the country harbors approximately 14.89 crore goats, which represents roughly 14.5 percent of the global caprine population. Within the socio-economic framework of rural India, goat rearing is historically and colloquially designated as "Poor Man's Cow". It functions as a vital institutional safety net and an immediate livelihood base for small, marginal, and landless farmers. This strategic importance stems from its minimal initial capital investment requirements, low operational maintenance overheads, high fecundity, and the unique biological resilience of small ruminants to survive across hostile climatic and ecological variations.

National Livestock Context	
India's Goat Population	14.89 Crore (14.5% Global)
MP's Goat Population	1.02 Crore

In Madhya Pradesh, the livestock economy plays a transformative role in driving rural gross domestic product (RGDP), with goat husbandry acting as a primary driver. The state is home to approximately 1.02 crore goats, anchoring the livelihood security of a vast majority of the rural marginalized populace.

Rewa district, situated topographically within the sub-tropical Vindhya Plateau region, presents a distinct socio-economic landscape. A significant demographic segment of the district comprises tribal (ST), Dalit (SC), and Other Backward Classes (OBC) communities, who heavily rely on small ruminant production as an essential source of household income. Despite its widespread prevalence, caprine management practices in Rewa remain largely

traditional, extensive, and sub-optimal. However, tremendous scope exists to elevate the sector into a commercially lucrative enterprise through targeted scientific, nutritional, and technological interventions.

Against this background, the current research was conducted to critically evaluate the socio-economic status of beneficiary goat rearers in Rewa district. This paper thoroughly analyzes cost-benefit frameworks, measures localized employment generation dynamics, and identifies structural institutional bottlenecks to propose actionable policy matrices.

## 2. Review of Literature

The socio-economic dynamics of caprine production systems have received substantial attention globally and domestically. Ranjhan (2007) established that small ruminant production contributes an average of 20 to 35 percent to the total annual household income of marginal and smallholder farmers, highlighting its role as a buffer against crop failure. In a comprehensive regional assessment across Maharashtra, Shinde et al. (2012) observed that the benefit-cost ratio of traditional to semi-intensive goat farming fluctuated between 1.52 and 1.84, validating its high economic viability.

In terms of regional income mapping, Kumar and Singh (2014) conducted an extensive economic inquiry in the agro-climatically distressed Bundelkhand region of Uttar Pradesh. They reported that the average annual net income derived from caprine rearing ranged between ₹22,000 and ₹34,000 per family, functioning as a primary tool for liquid asset generation.

Gender-centric studies have similarly highlighted the transformative capacity of the sector. Girase and Tajane

(2016) evaluated the socio-economic impacts of goat husbandry in Western India, noting an impressive 42 percent escalation in the personal income levels of female beneficiaries. This finding aligns with Meena et al. (2019), who demonstrated that tribal women in Rajasthan achieved higher economic independence, improved domestic decision-making power, and enhanced nutritional status through structured small ruminant interventions.

At the macro-policy level, Gupta and Sharma (2020) evaluated institutional livestock schemes in Central India. Their findings revealed that converged credit frameworks via the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and the National Bank for Agriculture and Rural Development (NABARD) significantly enhanced asset building among smallholders. On an international scale, the Food and Agriculture Organization (FAO, 2021) highlighted that caprine husbandry directly or indirectly supports over 350 million livelihoods across South Asia, reinforcing its role as an essential pillar for sustainable development.

A critical evaluation of existing literature indicates a clear research gap: no comprehensive, localized empirical study focuses specifically on the micro-economics of goat farming within Rewa district. Given that the Vindhya region is characterized by rain-fed agriculture, frequent monsoon dry spells, and highly fragmented land holdings, this study addresses that gap by presenting a micro-level economic evaluation.

### 3. Research Objectives

The specific academic and empirical objectives designed for this investigation are as follows:

- To analyze the socio-economic and demographic characteristics of caprine-rearing households in Rewa district.
- To evaluate the explicit and implicit cost structures, estimate gross returns, and calculate the benefit-cost ratio (BCR) across various flock sizes.
- To quantify the volume of employment generation (measured in human man-days) and net income generated by caprine enterprises.

- To identify and mathematically model the key socio-economic and operational determinants influencing net returns using regression analysis.
- To document and rank the major institutional, environmental, and infrastructural constraints faced by goat rearers and outline targeted policy recommendations.

## 4. Research Methodology

### 4.1 Study Area

Rewa district is geographically situated within the northeastern domain of Madhya Pradesh, falling under the Vindhya division. Geographically, it extends between latitudes  $24^{\circ}18'\text{N}$  and  $25^{\circ}12'\text{N}$ , and longitudes  $81^{\circ}2'\text{E}$  and  $82^{\circ}18'\text{E}$ . The district encompasses a total geographical area of 6,324 square kilometers. According to the 2011 Census, Rewa harbors a total population of 23,65,106, with approximately 77.4 percent residing in rural zones. The administrative layout comprises 8 designated development blocks/tehsils. The demographic composition features a notable concentration of vulnerable communities, with Scheduled Castes (SC) representing 22.8 percent and Scheduled Tribes (ST) constituting 12.4 percent of the total population.

### 4.2 Sampling Design

This study adopted a purposive multi-stage sampling design to ensure representative data selection:

- **Stage I:** Six out of nine tehsils in Rewa district were purposively selected based on their high concentration of caprine livestock populations.
- **Stage II:** From each selected tehsil, 4 to 6 villages were chosen based on the density of households actively practicing goat husbandry.
- **Stage III:** Within each village, individual goat rearers were selected utilizing a simple random sampling method.

The final sample size comprised 120 primary respondent households.

**Table 1:** Sample Distribution by Tehsil

Tehsil	Total Villages	Surveyed Villages	Total Goat-Rearing Families	Surveyed Households	Percentage (%)
Gangev	48	4	312	20	16.7
Jawa	62	5	405	22	18.3
Teonthar	55	4	358	20	16.7
Gurh	70	6	478	22	18.3
Raipur Karchuliyan	44	4	290	18	15
Sirmour	51	4	320	18	15
Total	330	27	2163	120	100

(Source: Field Survey, 2023–24)

### 4.3 Data Collection

Primary data were systematically collected using a structured, pre-tested schedule and face-to-face interviews during 2023–24. The primary questionnaire covered variables including respondent socio-demographics, fixed and variable cost items, income streams, labor allocation,

marketing frameworks, credit access, and operational challenges. Secondary data were gathered from the District Animal Husbandry Department (Rewa), NABARD regional updates, the Central Institute for Research on Goats (CIRG), and relevant government reports.

#### 4.4 Analytical Tools

Data processing and evaluation were performed using SPSS v.26 and MS Excel. The analytical framework included:

- **Descriptive Statistics:** Frequency distributions, arithmetic means, standard deviations, and percentages.
- **Cost-Benefit Analysis:** Calculated through total variable cost, fixed overheads, gross returns, and net profit margins.
- **Multiple Linear Regression Modeling:** Used to assess factors affecting income, specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu_0$$

Where:

- Y = Net Annual Income (₹)
- X<sub>1</sub> = Flock Size
- X<sub>2</sub> = Land Holding Size (ha)
- X<sub>3</sub> = Education Level
- X<sub>4</sub> = Veterinary Access Index
- X<sub>5</sub> = Market Distance (km)
- X<sub>6</sub> = Training Received (Dummy: 1 if received, 0 otherwise)
- X<sub>7</sub> = Gender of Primary Manager (Dummy: 1 if Female, 0 if Male)
- $\mu_0$  = Stochastic Error Term.
- **Garrett's Ranking Technique:** Employed to prioritize and rank constraints.

#### 4.5 Diagnostic Tests for the Regression Model

To ensure the validity and reliability of the regression estimates, several diagnostic tests were performed before interpreting the regression coefficients.

**Multicollinearity:** Multicollinearity among the explanatory variables was examined using the Variance Inflation Factor (VIF) and Tolerance statistics. Variables with VIF values below 10 (preferably below 5) and Tolerance values above 0.10 were considered free from serious multicollinearity.

**Normality of Residuals:** The assumption of normality was assessed through the Shapiro–Wilk test, Normal P–P Plot, histogram of standardized residuals, and Q–Q plot. Residuals approximating a normal distribution indicated that the normality assumption was satisfied.

**Homoscedasticity (Heteroscedasticity Test):** The presence of heteroscedasticity was examined using the Breusch–Pagan test and visual inspection of the scatter plot of standardized residuals against standardized predicted values. A random dispersion of residuals and a non-significant Breusch–Pagan test ( $p > 0.05$ ) indicated constant error variance.

**Independence of Errors:** The Durbin–Watson statistic was computed to assess autocorrelation among residuals. Values close to 2 indicated independence of errors.

Only after confirming that these assumptions were reasonably satisfied were the regression coefficients interpreted.

#### 4.6 Garrett's Ranking Technique

Garrett's Ranking Technique was employed to identify and prioritize the major constraints experienced by goat rearers. Respondents ranked the listed constraints according to their perceived importance. The assigned ranks were converted into Garrett scores using Garrett's conversion table, and the mean scores were computed. Constraints were finally ranked according to their average Garrett scores, with the highest mean score representing the most severe constraint.

## 5. Results and Discussion

### 5.1 Socio-economic Profile

The empirical assessment revealed that 45.0 percent of the surveyed caprine rearers are marginal farmers owning less than 1 hectare of land, while 31.7 percent fall into the small farmer bracket. This underscores that goat rearing functions primarily as a critical resource for smallholder agricultural systems. Social stratification data showed that SC and ST groups account for 50.8 percent of the sample, reflecting the high reliance of marginalized communities on this sector.

**Table 2:** Socio-economic Profile of Beneficiaries

Characteristic	Category	Number (n=120)	Percentage (%)
Land Holding	Marginal (<1 hectare)	54	45
	Small (1-2 hectare)	38	31.7
	Medium (2-4 hectare)	20	16.7
	Large (>4 hectare)	8	6.6
Social Category	Scheduled Caste (SC)	39	32.5
	Scheduled Tribe (ST)	22	18.3
	Other Backward Class (OBC)	41	34.2
	General	18	15
Education	Illiterate	28	23.3
	Primary	42	35
	Secondary	36	30
	Graduate & Higher	14	11.7
Flock Size	Small Herd (1–5 Goats)	48	40
	Medium Herd (6–10 Goats)	43	35.8
	Large Herd (>10 Goats)	29	24.2

(Source: Field Data, 2023–24)

### 5.2 Cost Structure Analysis

The operational cost analysis showed that variable costs constitute the vast majority of total inputs, ranging from 88 to 90 percent across all categories. Within variable costs, feed and fodder expenditures represent the largest component, accounting for 50 to 52 percent of total outlays. This matches cost patterns observed by Kumar & Singh (2014). The data also confirm economies of scale, as the average per-capita maintenance cost decreased as flock sizes expanded.

**Table 3: Cost Structure of Goat Farming (₹ per Annum per Household)**

Cost Item	Small Herd (1-5)	Medium Herd (6-10)	Large Herd (>10)
<b>A. Variable Costs</b>			
Feed & Fodder Cost	8,240	14,680	24,350
Veterinary & Medicine	1,120	2,340	4,180
Labor Cost (Family + Hired)	4,380	7,920	14,640
Marketing & Transport	680	1,240	2,380
Miscellaneous Variable Costs	420	780	1,420
<b>Total Variable Cost (A)</b>	<b>14,840</b>	<b>26,960</b>	<b>46,970</b>
<b>B. Fixed Costs</b>			
Shed Depreciation	880	1,480	2,640
Equipment Depreciation	320	560	980
Interest on Capital Asset	640	1,180	2,080
<b>Total Fixed Cost (B)</b>	<b>1,840</b>	<b>3,220</b>	<b>5,700</b>
<b>Total Cost (A+B)</b>	<b>16,680</b>	<b>30,180</b>	<b>52,670</b>

(Source: Field Data, 2023-24)

**5.3 Returns and Benefit-Cost Ratio (BCR)**

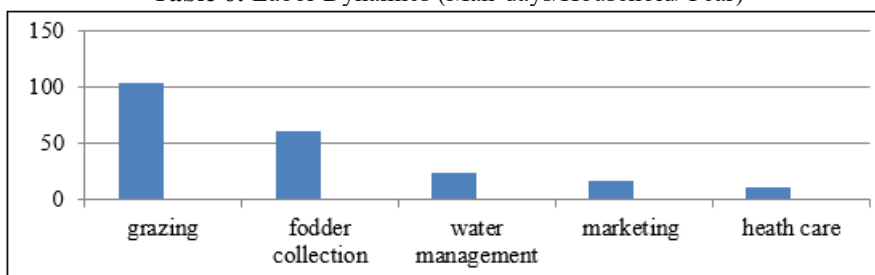
Meat sales generate the largest share of gross caprine revenue (60-62%), followed by the sale of kids (25-27%). Income from milk and manure remains secondary. Large herds achieved the highest benefit-cost ratio (2.09), outperforming small herds (1.81), which further confirms the advantages of scaling up operations. The overall average BCR of 1.68 underscores that goat farming is highly viable in the district.

**Table 4: Returns and Benefit-Cost Ratio from Goat Farming**

Income Item	Small Herd (1-5)	Medium Herd (6-10)	Large Herd (>10)
Meat Sale Revenue	18,200	35,640	68,400
Kid Sale Revenue	7,800	14,200	26,500
Milk Sale Revenue	3,480	6,720	12,840
Manure / Organic Waste	720	1,380	2,560
<b>Gross Income</b>	<b>30,200</b>	<b>57,940</b>	<b>1,10,300</b>
<b>Total Cost</b>	<b>16,680</b>	<b>30,180</b>	<b>52,670</b>
<b>Net Profit</b>	<b>13,520</b>	<b>27,760</b>	<b>57,630</b>
<b>Benefit-Cost Ratio (BCR)</b>	<b>1.81</b>	<b>1.92</b>	<b>2.09</b>
<b>Net Profit per Goat (₹)</b>	<b>3,380</b>	<b>3,470</b>	<b>3,920</b>

(Source: Field Data, 2023-24)

**Table 6: Labor Dynamics (Man-days/Household/Year)**



(Total labor generated across activities = 239.6 gross components before standard adjustments).

**5.6 Marketing Behaviour**

The market survey revealed that 68.3 percent of producers sell their livestock at local village weekly markets (*haats*), 18.3 percent rely on middlemen, and only 13.4 percent sell directly to end consumers. This high reliance on intermediaries often prevents producers from receiving competitive prices. While market prices increase by 35 to 60

**5.4 Income Determinants: Regression Analysis**

The multiple linear regression model accounted for 78.2% of the variance in net annual income ( $R^2 = 0.782$ ). Herd size ( $\beta = 3642.8$ ), access to veterinary services ( $\beta = 2940.3$ ), and formal training ( $\beta = 4218.9$ ) emerged as positive determinants of income. Conversely, distance to physical livestock markets exerted a significant negative effect on profitability ( $\beta = -386.7$ ), highlighting how poor access to markets reduces net returns.

**Table 5: Regression Analysis of Factors Affecting Income**

Independent Variable	$\beta$ Coefficient	Standard Error	t-value	Significance (Sig.)
Intercept (Constant)	-4218.6	1842.3	-2.29	0.024*
Herd Size ( $X_1$ )	3642.8	312.4	11.66	0.000***
Land Holding ( $X_2$ )	2180.4	418.7	5.21	0.000***
Education Level ( $X_3$ )	1820.5	364.2	4.99	0.000***
Veterinary Access ( $X_4$ )	2940.3	582.1	5.05	0.000***
Market Distance ( $X_5$ )	-386.7	98.4	-3.93	0.000***
Training Received ( $X_6$ )	4218.9	934.6	4.51	0.000***
Gender Leader ( $X_7$ )	1640.2	412.8	3.97	0.000***

**Model Fit Statistics:**  $R^2 = 0.782$  | Adjusted  $R^2 = 0.764$  | F (8, 111) = 43.28 |  $p < 0.001$   
 Note: \*  $p < 0.05$ , \*\*\*  $p < 0.001$ ; Dependent Variable = Net Annual Income (₹)

**5.5 Employment Generation**

Goat rearing generates an average of 182 human man-days of labor per family annually. Women contribute 38.2% of this total labor allocation, highlighting the sector's role in supporting rural gender inclusion. However, child labor accounts for 10.3% of labor allocation, primarily for grazing and fodder collection, which presents an ongoing socio-developmental challenge.

percent during major festivals (e.g., Eid-ul-Adha, Diwali), most smallholders cannot align their production cycles to capitalize on these seasonal peaks.

**5.7 Major Constraints**

Using Garrett's ranking technique, high disease incidence and mortality rates emerged as the most critical challenge

(Garrett Score: 0.836). Inadequate local veterinary services and limited access to improved breeds also ranked as prominent operational hurdles.

**Table 7: Priority of Constraints- Garrett Ranking**

Constraint Category	Most Critical (%)	Serious (%)	Garrett-Cohen Score	Institutional Rank
Disease & Fecal Mortality	72.5	18.3	0.836	I
Non-availability of Vet Care	68.3	21.7	0.792	II
Lack of Improved Pedigree Breeds	64.2	24.2	0.763	III
Poor Structured Market Linkage	58.3	28.3	0.721	IV
Institutional Credit Constraints	54.2	30.8	0.693	V
Diminishing Common Grazing Lands	48.3	32.5	0.643	VI
Wildlife Predation	44.2	28.3	0.588	VII
Deficit in Technical Knowledge	38.3	34.2	0.553	VIII
Chronic Water Scarcity	32.5	36.7	0.508	IX

### Gender Dimensions and Social Inclusion

Women operate as the primary managers in 38.3 percent of the surveyed households. Households managed by women generated an average of ₹4,200 more in annual caprine income than those managed by men, which can be attributed to closer animal monitoring and higher care standard interventions. Women organized within Self-Help Groups (SHGs) also demonstrated higher success rates in securing institutional loans.

For SC/ST households, who comprise 50.8 percent of the sample, goat husbandry represents a core livelihood due to limited alternative employment options. However, these groups report low utilization rates for specialized state schemes, such as the Goat Unit Scheme or NABARD's Goat Enterprise Schemes, indicating a clear need to improve policy implementation and delivery.

### 6. Policy Recommendations

- **Pedigree and Breed Improvement:** Establish community breeding centers to introduce performance-tested bucks (e.g., Jamunapari X Indigenous local cross) adapted to the Vindhya region.
- **Decentralized Health Infrastructure:** Deploy mobile veterinary clinics and implement routine vaccination programs through Gram Panchayats to control Peste des Petits Ruminants (PPR) and foot-and-mouth disease.
- **Digital Market Integration:** Organize smallholders into Producer Organizations (FPOs) and link them to the e-NAM platform to reduce reliance on intermediaries.
- **Targeted Credit Instruments:** Simplify the application process for the Kisan Credit Card (KCC) for livestock and offer interest subventions to SHG-banking frameworks.
- **Capacity Building:** Strengthen training programs on scientific animal management at local Krishi Vigyan Kendras (KVKs).

- **Subsidized Livestock Insurance:** Introduce low-cost, government-backed insurance options specifically tailored for women and SC/ST smallholders.

### 7. Conclusion

This study demonstrates that goat farming is an economically viable and socially inclusive enterprise in Rewa district. An average benefit-cost ratio of 1.68, annual net returns of ₹38,420, and the generation of 182 man-days of labor underscore its role in supporting smallholder livelihoods. The enterprise provides a key income source for small, marginal, and SC/ST households, as well as women-led families.

Addressing core operational challenges—including high animal mortality, limited veterinary access, poor market integration, and weak credit linkages—remains essential. Implementing targeted interventions in breed improvement, animal health, and marketing infrastructure can strengthen the caprine sector's contribution to rural poverty alleviation and support Sustainable Development Goals (SDG 1: No Poverty, SDG 2: Zero Hunger, and SDG 8: Decent Work and Economic Growth) across the region.

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### Conflict of Interest

The authors declare no conflicts of interest regarding this research.

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