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Intensification Without Empowerment?

Gendered Time Burdens in India's Livestock Sector

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Abstract

This paper provides a nationally representative assessment of changes in women's work in livestock rearing in rural India using unit-level data from the Time Use Surveys (TUS) 2019 and 2024. By situating the analysis within debates on the feminization of agriculture, the study examines shifts in participation and time allocation in livestock rearing among rural working-age individuals (15–59 years). While women's participation in economic work increased modestly between 2019 and 2024, this expansion continues to coexist with a persistently high burden of unpaid domestic and caregiving services. Within agriculture, livestock emerges as a relatively more dynamic and gendered domain of work.

Using the 2016 International Classification of Activities for Time-Use Statistics (ICATUS), livestock activities are disaggregated into own use and market-oriented livestock activities. Descriptive evidence shows that women's participation in livestock activities increased from 11 percent in 2019 to 15 percent in 2024, with a particularly notable rise in market-oriented livestock activities across several states and agroecological zones. Although crop husbandry continues to dominate agricultural employment, both incidence and intensity of participation of women in livestock rearing has visibly increased.

Regression results indicate a positive and significant year effect for total livestock and livestock activities, but not for livestock own-use activities, suggesting that the observed increase is primarily associated with market-oriented engagement rather than subsistence expansion. Education exhibits a strong negative association with livestock time use, especially for women, indicating that livestock remains a fallback activity under constrained employment options. Gelbach decomposition further shows that changes in age composition and educational attainment account for a substantial share of the explained variation, while monthly per capita consumption expenditure has a stronger and more consistently significant association with women's livestock time use than men's. Overall, the findings point to incremental change within a persistently gendered structure of rural time allocation.

Keywords: Women's work; livestock rearing; time use survey; rural India; feminization of agriculture; gendered time allocation; Gelbach decomposition.

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Introduction

Women's participation in agriculture has been steadily increasing worldwide, with growing evidence of the "feminization of agriculture" (World Bank 2016; FAO 2011; Slavchevska et al. 2019). Between 1980 and 2010, women's share of the economically active population in agriculture rose across developing regions, reaching about 43 percent of the agricultural labor force by 2010. This shift has often been linked to structural transformation: as men migrate to nonfarm sectors or overseas employment, women assume greater responsibility for farming and allied activities (Ali et al. 2016). Although recent estimates suggest modest global decline—with women constituting about 38.5 percent of the agricultural labor force in 2022 (FAO Statistical Yearbook 2024)—regional disparities remain striking. In sub-Saharan Africa, women account for over half of the agricultural workforce in many countries, while participation remains consistently high in South and Southeast Asia. These patterns underscore both the persistence of women's central role in agriculture and the continuing relevance of feminization debates in understanding agrarian change.

Yet the developmental implications of feminization remain contested. The rise of women's participation may reflect expanding economic opportunities and greater market integration, but it may also signal labor substitution as a result of outmigration by men, distress-driven work intensification, or the expansion of unpaid responsibilities within persistent gender hierarchies (Doss 2018; Meinzen-Dick et al. 2019). A central limitation of existing evidence is its reliance on participation rates and employment shares, which obscure shifts in time intensity and the coexistence of paid and unpaid work. Participation indicators cannot distinguish between subsistence-oriented production embedded within household reproduction and market-linked engagement connected to commercialization. Nor do they capture whether increased visibility in agriculture corresponds to a reduction of domestic burdens or to a further compression of women's time. Reassessing feminization through the lens of time allocation is therefore critical to understanding whether agrarian transitions are genuinely empowering or are simply redistributing labor within unequal structures.

Within agriculture, livestock has emerged as a particularly important domain of women's work. Globally, an estimated 400–600 million rural women are engaged in livestock production (Kristjanson et al. 2010; Njuki & Sanginga 2013). Livestock is frequently promoted as gender-inclusive because of its proximity to the homestead, compatibility with household responsibilities, and potential for regular income through dairy and small ruminants (World Bank 2019). Evidence suggests that when women control income from livestock, households allocate more resources to food, healthcare, and children's education, improving food security and nutrition outcomes (Meinzen-Dick et al. 2019). At the same time, livestock activities are deeply shaped by socioeconomic status, caste, land ownership, and asset control (Kak 1994; Sen & Sen 1985; Mukherjee & Majumder 2015; Patel & Mitra 2015). Herd size, technology adoption, and seasonality further mediate time commitments and labor intensity (Christy 2002; Dhaka et al. 1993; Tulachan & Neupane 1999; Swaminathan 2020). Despite this rich micro-level evidence, systematic analysis of how livestock commercialization reshapes women's time allocation at a national scale remains limited.

India provides a critical empirical setting to examine these dynamics. As one of the world's largest agrarian economies undergoing late structural transformation, India has experienced sustained growth in its livestock sector alongside continued rural underemployment and entrenched gender norms governing asset ownership and mobility. Women make up a substantial share of the livestock workforce, yet their contribution is often undercounted in conventional labor statistics. While much of the Indian literature has focused on crop

agriculture, far less attention has been paid to how women's participation and time allocation in livestock are evolving under commercialization pressures. Understanding whether livestock expansion narrows gender gaps in productive engagement or reinforces segmentation between market-facing and household-based activities is therefore central to broader debates on gendered structural transformation.

This paper addresses this gap using nationally representative Time Use Survey (TUS) data from 2019 and 2024. By distinguishing livestock activities for own use from those undertaken for market-oriented production, the analysis moves beyond participation measures to better examine both incidence and intensity of engagement. In addition to descriptive trends, regression models and Gelbach (2016) decomposition techniques are employed to separate unconditional shifts in livestock time from changes attributable to demographic composition, education, economic status, and asset ownership. The results reveal a nuanced pattern: women's participation in livestock has increased, driven primarily by market-oriented engagement, but exists alongside persistently high unpaid domestic responsibilities and strong negative associations with education. These findings challenge celebratory narratives of livestock-led empowerment by demonstrating that commercialization can coexist with unequal labor burdens and segmented control over productive assets. By reevaluating feminization through the lens of time use rather than participation alone, the study contributes to debates on gendered agricultural commercialization and the distributional consequences of structural transformation in developing economies.

Data and Methodology

Data

The Time Use Survey (TUS) is a comprehensive survey that provides valuable insights into how individuals navigate their daily lives and allocate time across work, leisure, and household responsibilities (National Statistical Office [NSO], 2020; NSO, 2025). The TUS marked a significant step toward understanding the dynamics of time allocation across different activities by men and women across India. The TUS 2019 covered a total of 138,799 households nationwide, including 82,897 households in rural areas and 55,902 households in urban areas. In the subsequent round (2024), the survey covered 139,489 households nationwide, including 83,247 rural and 56,242 urban households. For the present study, we restrict the sample to rural households and working-age individuals (15–59 years). Data from both "normal days" and "other days" are included in the analysis.

From a total of 329,682 diaries in 2019, working-age individuals were comprised of 165,283 men and 164,399 women. In rural areas, 198,231 diaries were recorded, including 98,292 men and 99,939 women. In 2024, a total of 332,874 diaries were collected, of which 165,879 were men and 166,995 were women of working age. In rural areas, 205,741 diaries were recorded, including 100,775 men and 104,966 women.

Among the rural working-age population, 24,834 individuals (12,144 men and 12,690 women) reported participation in livestock activities for own use and/or market-oriented in 2019. The corresponding number in 2024 was 34,242 individuals (16,565 men and 17,677 women). These individuals constitute the analytical sub-sample for the detailed analysis of livestock activities undertaken in this study.

The survey adopted methodological rigor, including the use of the International Classification of Activities for Time-Use Statistics 2016 (ICATUS 2016) (United Nations Statistics Division 2021). Activities are classified using three-digit codes to ensure precise categorization. The

TUS records the principal activity performed by an individual, including farm work, without distinguishing between self-employed workers and laborers.

Activities are grouped into nine major categories: (1) Employment and related activities; (2) Production of goods for own final use; (3) Unpaid domestic services; (4) Unpaid caregiving services; (5) Unpaid volunteer and other unpaid work; (6) Learning; (7) Socializing and community participation; (8) Culture, leisure, and sports; and (9) Self-care and maintenance. For descriptive purposes, we combine these into four broad groups: categories 1–2 as 'work'; 3–5 as 'household chores and caregiving'; 6 as 'learning'; and 7–9 as 'leisure'.

While these broader categories provide the overall framework (as presented in Table 1), the analytical focus of this study is on 'work' activities, particularly agricultural work. We further classify agricultural activities into crop husbandry, livestock rearing, and forestry & fishing using the three-digit ICATUS codes. Within livestock rearing, we separately identify livestock activities for own use and market-oriented, which form the core analytical categories examined in this paper.

Methodology

Identifying Agroecological Zones

The analysis is undertaken at the regional level by aggregating district-level data. The agroecoregional approach has been widely recognized for its ability to capture spatial heterogeneity in resource endowments, production systems, and technological adoption. In India, multiple efforts have been made to delineate agroclimatic and agroecological regions, notably by the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), the Planning Commission, the National Agricultural Research Project (NARP), and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). The National Centre for Agricultural Economics and Policy Research (NCAP) further refined these classifications by integrating key elements from earlier approaches (Saxena et al. 2001). Kumar and Singh (2008) also emphasize substantial interregional variations in agricultural and livestock production systems, underscoring the need for region-specific analytical frameworks and policy design.

Following this framework, districts are classified into five broad agroecological regions based on climatic conditions and topography: arid, coastal, hill and mountain, irrigated, and rainfed regions. This classification is adopted with suitable modifications to account for the creation of new districts and changes in administrative boundaries.

Regression Analysis and Gelbach Decomposition Method

In addition to descriptive analysis of the Time Use Survey (TUS), we employ the decomposition framework developed by Gelbach (2016) to quantify the extent to which socioeconomic and demographic factors account for observed shifts in time allocation. The use of the decomposition method will help in estimating both unconditional change in time allocation across three key activities—total livestock, livestock for own use, and market-oriented livestock—and to determine how much of this change can be attributed to compositional shifts in the observable characteristics. Each outcome variable is measured as the log-transformed daily minutes spent on the respective activity. The empirical exercise begins with a restricted (base) regression model that includes only a binary indicator for the year 2024 (coded 1 for 2024 and 0 for 2019):

$$y_{it} = \beta_{\text{base}} \cdot \text{Year}_{2024} + \nu_{it}$$

where y_{it} represents the log time use by individual i on a specific activity in year t, and β_{base} captures the unconditional average change in time use between 2019 and 2024.

To account for observable differences across individuals and households, a full model is estimated:

$$y_{it} = \beta_{\text{full}} \cdot \text{Year}_{2024} + \mathbf{x}_{it}'\gamma + \varepsilon_{it}$$

where x_{it} is a vector of covariates including log-transformed age and household size, gender, marital status, caste (Scheduled Tribe, Scheduled Caste, Other Backward Class, Others), religion (Hinduism, Islam, others), education level (from no formal schooling to graduate and above), log monthly per capita consumption expenditure (MPCE), land ownership categories, dwelling type (kutcha, semi-pucca, pucca), and state fixed effects. The coefficient β_{full} captures change in the time use attributable to the year, net of differences in these covariates.

To explain how much of the change in the year coefficient between the base and full models is attributable to specific sets of variables, the decomposition approach is used. We decompose the difference $\beta_{base} - \beta_{full}$ into additive contributions from individual blocks of covariates based on the omitted variable bias formula. Specifically, it expresses the change as:

$$\beta_{\text{base}} - \beta_{\text{full}} = \sum_k \eta_k \cdot \gamma_k$$

where γ_k represents the coefficient of variable k from the full regression, and η_k is the coefficient from a regression of covariate k on the year dummy and the remaining covariates. Grouping covariates thematically (for example, demographics, identity, education, economic status), this method attributes the explained portion of the year effect to conceptually meaningful factors.[1]

To further explore heterogeneity in time-use changes, we apply the same approach separately to the subsamples of individuals engaged in agricultural and nonagricultural activities. This enables identification of sector-specific patterns that different covariate groups contribute to changes in time allocation.

Results and Discussion

Time-use data from 2019 and 2024 show both continuity and gradual change in the gendered division of labor in rural India. As reported in Table 1, women's participation in economic work increased modestly from 39 to 42 percent, with average work time rising from 92 to 99 minutes per day. Men also registered a slight increase in work participation, though from a much higher base. However, the enduring asymmetry in domestic labor is striking: women continue to devote about 286 minutes daily to household chores and caregiving, compared to only 38–41 minutes for men. This persistence of the care economy underscores structural

[1] The decomposition is implemented in Stata using the b1x2 command, which estimates the base and full models and performs decomposition in one step. Standard errors are clustered at the state level to account for within-state correlation. Sampling weights are applied to each regression to ensure population-representative estimates. However, consistent with Gelbach's methodological framework, the decomposition step is performed using unweighted regressions, as weights are not supported by b1x2 implementation and may violate the decomposition's mathematical properties.

constraints on women's ability to expand their participation in market-oriented work, reinforcing earlier evidence that the feminization of agricultural labor is often layered upon heavy domestic responsibilities.

Table 1: Changes in gender participation (%) and time allocation (minutes) across activities

Activities	Men		Women		All	
	2019	**2024**	**2019**	**2024**	**2019**	**2024**
Work	65.5 (282)	66.9 (297)	39 (92)	42.1 (99)	52.4 (188)	54.5 (198)
Household chores & caregiving	38.3 (41)	39 (38)	84.2 (287)	83.7 (286)	61 (162)	61.5 (162)
Learning	24.1 (102)	23.2 (96)	19.4 (82)	20.3 (84)	21.8 (92)	21.7 (90)
Leisure	100 (1015)	100 (1009)	100 (980)	100 (971)	100 (998)	100 (990)

Source: Authors' estimates based on unit-level data from the Time Use Survey (TUS), 2019 and 2024, National Statistical Office (NSO), Government of India.
Note: Figures in parentheses indicate time use in minutes.

The disaggregation of agricultural activities in Table 2 shows that livestock is a domain of notable change. Between 2019 and 2024, women's participation in livestock activities rose from 11 to 15 percent, closely mirroring men's increase. Within agriculture, crop activities continue to dominate time allocation, but the relative rise in livestock engagement is notable. Most importantly, as shown in Table 3, women's involvement is no longer confined to subsistence-oriented livestock care. Participation in market-linked livestock activities more than doubled (from 2.6 to 5.6 percent), indicating increasing participation of women in market-oriented livestock activities. Although average time use per participant declined slightly, the broadening of participation suggests wider household engagement and diversification into market-oriented production.

Table 2: Changes in participation (%) and intensity of participation (minutes) in agriculture and nonagriculture, 2019 and 2024

	Men		Women		All	
	2019	2024	2019	2024	2019	2024
1. Agriculture	37.0 (114)	39.0 (118)	32.0 (59)	35.9 (67)	34.5 (87)	37.4 (92)
1.1 Crop	31.5 (96)	32.7 (95)	23.3 (42)	24.7 (45)	27.5 (69)	28.7 (70)
1.2 Livestock	11.0 (15)	15.1 (19)	11.0 (13)	15.0 (18)	11.0 (14)	15.0 (19)
1.3 Forestry & Fishery	2.1 (3)	2.1 (3)	4.7 (4)	5.5 (4)	3.4 (3)	3.8 (4)
2. Nonagriculture	49.1 (168)	53.1 (180)	16.2 (32)	17.1 (32)	32.8 (101)	35.0 (106)

Source: Same as above.
Note: Figures in parentheses indicate time use (minutes per participant per day).

Together, these findings contribute to ongoing debates on the feminization of agriculture and the care economy. They show that while women remain disproportionately engaged in unpaid domestic labor, livestock rearing is becoming a relatively more accessible livelihood option for women, offering pathways into semi-commercial agricultural markets. This duality underscores the interlinkages between care work and productive work: unless the burden of household tasks is reduced, women's ability to fully benefit from commercialization opportunities in livestock will remain constrained. Gender-responsive interventions—such as

credit and extension tailored for women, collective market linkages, and labor-saving technologies—could help leverage livestock's transformative potential for women's empowerment, rural resilience, and inclusive agricultural growth.

Table 3: Changes in participation (%) and time use by rural men and women (minutes/participant/day) in livestock activities

Livestock Activities	Men		Women		All	
	2019	2024	2019	2024	2019	2024
Market-oriented	3.1	6.2	2.6	5.6	2.8	5.9
	(173)	(158)	(132)	(138)	(154)	(148)
Own use	9.3	10.8	10.2	11.8	9.7	11.3
	(118)	(99)	(114)	(106)	(116)	(103)

Source: Same as above.
Note: Figures in parentheses indicate time use (minutes per participant per day).

Table 4 presents changes in participation rates and time use on livestock activities by rural men and women across agroecological zones between 2019 and 2024. Several patterns emerge. First, women consistently record higher participation in livestock activities for own use compared to men across all zones, reaffirming their central role in household-level livestock management. For example, in the arid zone, 27.6 percent of women reported participating in own-use livestock activities in 2024, compared with 12.8 percent of men. Similarly, in hill and mountain regions, women's participation was nearly twice that of men. However, in 2024, in the irrigated zone, women's participation was slightly lower by half a percent.

Second, the time intensity of women's work is also evident. Per-participant time use in own-use livestock activities is generally higher for women than for men in most zones, with women in the arid zone spending about 122 minutes per day in 2024 compared to 85 minutes for men. In market-oriented livestock activities, men tend to participate more frequently, but women's involvement is also rising, particularly in irrigated and rainfed zones, where women's participation nearly doubled between 2019 and 2024.

Finally, regional differences are stark. Participation in livestock activities for own use is highest in the hill and mountain regions, while market-oriented activities are more prominent in arid, irrigated, and rainfed zones. Coastal zones, by contrast, record the lowest levels of engagement, reflecting their distinct livelihood structures. These findings underscore the importance of accounting for agroecological variation when analyzing women's roles in livestock and designing targeted interventions.

Table 4: Changes in participation (%) and time use by rural men and women (minutes) in livestock activities by agroecological zones

Agroecological zones	Livestock Activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
Arid	Market-oriented	7.1	8.6	11.6	12.0	9.4	10.4
		(173)	(176)	(120)	(150)	(140)	(160)
	Own use	11.0	12.8	25.0	27.6	18.0	20.6
		(108)	(85)	(115)	(122)	(113)	(111)
Coastal	Market-oriented	3.8	4.4	3.2	3.6	3.5	4.0
		(192)	(211)	(151)	(156)	(172)	(185)
	Own use	4.1	2.2	4.1	2.9	4.1	2.6
		(113)	(113)	(89)	(105)	(101)	(109)
Hill & Mountain	Market-oriented	1.5	2.1	0.7	1.7	1.1	1.9
		(180)	(131)	(116)	(117)	(160)	(125)
	Own use	12.4	11.2	19.7	18.4	16.1	14.9
		(123)	(89)	(133)	(99)	(129)	(95)
Irrigated	Market-oriented	2.2	6.1	1.9	6.5	2.0	6.3
		(158)	(146)	(129)	(139)	(145)	(143)
	Own use	12.7	13.4	13.5	12.9	13.1	13.1
		(118)	(104)	(120)	(111)	(119)	(108)
Rainfed	Market-oriented	3.5	6.9	2.6	5.3	3.1	6.1
		(175)	(159)	(133)	(133)	(157)	(148)
	Own use	7.4	10.2	7.1	11.0	7.2	10.6
		(119)	(96)	(102)	(100)	(111)	(98)

Source: Same as above.
Note: Figures in parentheses indicate time use (minutes per participant per day)

Table 5 presents state-wise changes in participation in livestock activities among rural men and women between 2019 and 2024, distinguishing between market-oriented and own-use activities. Three broad patterns emerge. First, there is a general increase in participation in market-oriented livestock activities across most states, for both men and women, indicating a gradual shift towards commercialization. This trend is particularly evident in states with relatively stronger dairy and livestock value chains, such as Gujarat, Rajasthan, Punjab, Karnataka, Maharashtra, Bihar, and Uttar Pradesh. While men continue to dominate market-linked activities, the increase of women's participation in several of these states suggests a slow but discernible integration of women into commercial livestock production. Second, own-use livestock activities remain strongly feminized. In a majority of states—especially hill and rainfed regions such as Himachal Pradesh, Uttarakhand, Rajasthan, Jammu and Kashmir, and parts of eastern India—women's participation in own-use livestock activities equals or exceeds that of men. This reflects the continuing role of livestock as a household-based livelihood activity closely tied to women's unpaid labor in animal care and management. In several eastern and tribal states, rising participation in own-use livestock between 2019 and 2024 points to livestock's function as a coping mechanism in regions with limited nonfarm employment. Third, the transition from subsistence to market-oriented livestock activity is uneven across states. Some states show declining participation in own-use livestock alongside rising market participation, suggesting a shift toward more market-oriented livestock systems. In others, particularly in poorer regions, increases are observed in both categories, indicating livelihood diversification rather than structural transformation. This duality highlights the coexistence of commercial and subsistence livestock systems within rural India.

Overall, the table underscores that while livestock is emerging as an important avenue for income diversification, especially for women, their participation remains largely concentrated in low-return and unpaid segments. Persisting gender gaps in market participation points to structural constraints related to asset ownership, market access, and institutional support. Strengthening women's integration into livestock value chains—through cooperatives,

extension services, and credit—remains critical for translating their labor contributions into economic gains, alongside measures to enhance women's control over income and decision-making from livestock production.

Table 5: Changes in participation (%) rural men and women in livestock activities by states

States	Livestock Activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
Andhra Pradesh	Market-oriented	7.8	9.2	5.1	6.1	6.4	7.6
	Own use	4.3	2.4	3.0	1.2	3.7	1.8
Arunachal	Market-oriented	.0	4.2	.0	1.4	.0	2.8
Pradesh	Own use	8.3	2.2	7.3	2.7	7.8	2.4
Assam	Market-oriented	1.0	2.6	.2	2.0	.6	2.3
	Own use	7.2	8.6	4.2	10.7	5.7	9.7
Bihar	Market-oriented	1.9	5.2	.8	4.6	1.4	4.9
	Own use	6.6	11.6	3.8	9.7	5.2	10.6
Chhattisgarh	Market-oriented	.7	1.5	.1	.8	.4	1.2
	Own use	7.9	8.4	3.9	4.1	5.9	6.2
Goa	Market-oriented	.4	1.2	.1	.0	.2	.6
	Own use	.1	.0	.2	1.3	.1	.6
Gujarat	Market-oriented	8.2	12.1	12.9	15.6	10.5	13.8
	Own use	7.0	3.8	12.5	8.8	9.7	6.2
Haryana	Market-oriented	1.1	5.6	2.4	6.6	1.7	6.0
	Own use	16.9	18.3	27.4	21.3	21.9	19.8
Himachal	Market-oriented	.1	.5	.4	2.2	.3	1.4
Pradesh	Own use	20.8	23.1	45.6	44.7	33.9	34.5
Jammu &	Market-oriented	2.6	.7	.5	.1	1.5	.4
Kashmir	Own use	22.9	15.5	24.1	16.8	23.5	16.1
Jharkhand	Market-oriented	.2	5.0	.7	5.5	.5	5.3
	Own use	5.8	11.9	4.2	14.0	5.0	13.0
Karnataka	Market-oriented	2.8	10.7	1.4	5.5	2.1	8.1
	Own use	9.6	6.2	7.1	3.0	8.3	4.6
Kerala	Market-oriented	2.3	2.1	2.3	1.3	2.3	1.7
	Own use	1.7	.9	3.1	2.1	2.4	1.6
Madhya Pradesh	Market-oriented	2.0	4.2	.5	3.8	1.2	4.0
	Own use	12.9	26.8	9.2	25.8	11.1	26.3
Maharashtra	Market-oriented	6.6	11.2	3.1	3.7	4.9	7.5
	Own use	5.2	2.9	2.2	1.2	3.7	2.1
Manipur	Market-oriented	1.2	3.0	.8	1.0	1.0	2.0
	Own use	1.2	3.8	2.5	3.3	1.8	3.5
Meghalaya	Market-oriented	2.9	.9	1.1	.7	2.0	.8
	Own use	9.6	2.4	1.6	1.8	5.5	2.1
Mizoram	Market-oriented	2.0	7.6	4.2	2.6	3.1	5.1
	Own use	2.5	1.9	1.7	.9	2.1	1.4
Nagaland	Market-oriented	1.2	3.6	.4	3.6	.8	3.6
	Own use	4.8	25.3	5.6	15.9	5.2	20.4
Odisha	Market-oriented	1.6	3.1	1.3	2.2	1.5	2.6
	Own use	6.0	4.6	7.8	5.6	6.9	5.1
Punjab	Market-oriented	4.4	9.0	3.3	7.5	3.9	8.3
	Own use	8.1	9.0	10.2	11.0	9.1	9.9
Rajasthan	Market-oriented	3.0	7.4	5.1	12.7	4.1	10.2
	Own use	12.3	21.1	31.2	42.3	21.8	32.3
Sikkim	Market-oriented	14.0	17.4	8.0	6.4	11.1	11.9
	Own use	10.1	7.5	5.9	5.2	8.1	6.4
Tamil Nadu	Market-oriented	6.2	6.4	6.5	8.7	6.3	7.6
	Own use	1.7	1.2	1.3	1.4	1.5	1.3
Telangana	Market-oriented	4.7	5.7	1.6	1.3	3.2	3.4
	Own use	3.9	3.3	1.0	1.5	2.4	2.4
Tripura	Market-oriented	1.8	2.2	1.5	1.6	1.6	1.9

States	Livestock Activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
	Own use	3.9	7.6	5.0	8.3	4.4	8.0
Uttar Pradesh	Market-oriented	2.3	7.5	2.0	7.4	2.2	7.5
	Own use	18.8	18.1	17.8	14.5	18.3	16.3
Uttarakhand	Market-oriented	1.4	1.2	.4	2.0	.9	1.6
	Own use	11.9	9.4	26.9	27.5	19.6	18.6
West Bengal	Market-oriented	1.9	2.2	1.8	3.3	1.8	2.8
	Own use	3.9	4.4	5.5	7.9	4.7	6.3
All UTs	Market-oriented	1.3	1.4	.2	1.1	.8	1.3
	Own use	3.8	1.7	1.9	1.6	2.9	1.6

Source: Same as above.

Intensity of Participation in Livestock Activities

Table 6 reports changes in the **time intensity of livestock activities** among rural men and women across states between 2019 and 2024, distinguishing between market-oriented and own-use activities. The evidence points to three salient features.

First, **market-oriented livestock activities are generally time-intensive**, with participants devoting between two to four hours per day in several states. In many regions, including Andhra Pradesh, Kerala, Gujarat, Haryana, Rajasthan, and Uttarakhand, average time use in market activities increased or remained high over time, suggesting increasing time intensity in market-oriented livestock activities. However, in some states such as Tamil Nadu, Telangana, West Bengal, and parts of the northeast, a decline in time intensity is observed, possibly reflecting mechanization, diversification into nonfarm work, or exit of marginal producers.

Second, **gender gaps in time intensity persist but are narrowing in several states**. Men continue to spend more time than women in market-oriented livestock activities in most states. Nonetheless, women's time intensity increased sharply in a few states—most notably Bihar, Uttarakhand, Gujarat, Kerala, and Jammu and Kashmir—indicating greater time involvement of women in market-oriented livestock activities. In contrast, in states such as Himachal Pradesh and Manipur, women's time use in market-oriented activities declined alongside declines in own-use activities and male participation, suggesting a broader reduction in engagement with livestock rather than a shift toward subsistence roles.

Third, **own-use livestock activities show a decline in time intensity in many states**, for both men and women. This reduction is particularly evident in southern and western states such as Karnataka, Kerala, Tamil Nadu, Maharashtra, and Telangana, indicating a gradual withdrawal from subsistence livestock rearing. However, in several eastern and central states—Chhattisgarh, Bihar, Jharkhand, and Madhya Pradesh, for example—time use on own-use livestock either increased or remained substantial, underscoring the continued role of livestock as a household-based livelihood and risk-buffering strategy.

Overall, the table suggests that while livestock is becoming increasingly market-oriented in parts of rural India, **women's engagement remains uneven and state-specific**. Where women participate more intensively often coincides with states exhibiting stronger dairy infrastructure or collective institutions. Nevertheless, the persistence of high time commitments in own-use livestock—especially among women—indicates that a significant share of their labor remains unpaid or poorly remunerated and weakly linked to markets, and even market-oriented activities do not necessarily translate into direct earnings or control over income. This reinforces the need for policy interventions that enhance women's access to livestock assets,

services, and value chains, alongside strengthening their ability to capture returns from participation.

Table 6: Changes in time use (minutes/participant/day) by rural men and women in livestock activities by states

States	Livestock Activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
Andhra Pradesh	Market-oriented	200	248	152	188	180	223
	Own use	140	116	120	159	131	131
Arunachal Pradesh	Market-oriented	120	132		59	120	114
	Own use	43	104	55	63	49	81
Assam	Market-oriented	125	120	67	61	116	94
	Own use	61	52	44	52	55	52
Bihar	Market-oriented	152	145	86	132	133	139
	Own use	112	107	92	103	104	105
Chhattisgarh	Market-oriented	243	203	390	174	254	193
	Own use	107	178	69	122	95	159
Goa	Market-oriented	147	264	118		143	264
	Own use	55		70	115	66	115
Gujarat	Market-oriented	136	114	109	136	120	126
	Own use	89	107	113	102	104	103
Haryana	Market-oriented	173	170	165	174	168	172
	Own use	120	122	132	148	127	136
Himachal Pradesh	Market-oriented	177	194	242	122	233	134
	Own use	129	85	177	117	163	107
Jammu & Kashmir	Market-oriented	288	249	103	260	254	250
	Own use	160	97	105	92	130	94
Jharkhand	Market-oriented	143	153	120	130	125	141
	Own use	135	100	99	88	120	93
Karnataka	Market-oriented	178	174	155	137	170	161
	Own use	108	99	101	67	105	89
Kerala	Market-oriented	211	234	127	158	166	202
	Own use	107	64	84	62	91	63
Madhya Pradesh	Market-oriented	153	164	107	121	145	145
	Own use	140	96	106	102	126	99
Maharashtra	Market-oriented	143	155	107	111	132	144
	Own use	107	83	77	80	98	82
Manipur	Market-oriented	153	122	144	82	150	112
	Own use	90	63	51	50	64	57
Meghalaya	Market-oriented	152	93	89	181	134	136
	Own use	54	52	48	40	53	46
Mizoram	Market-oriented	124	79	126	71	125	77
	Own use	156	83	228	57	184	74
Nagaland	Market-oriented	216	73	129	89	192	81
	Own use	81	83	57	49	68	69
Odisha	Market-oriented	207	207	123	129	169	173
	Own use	122	108	83	85	100	95
Punjab	Market-oriented	158	143	116	117	141	132
	Own use	129	117	96	121	111	119
Rajasthan	Market-oriented	167	168	130	143	143	151
	Own use	119	93	116	132	117	120
Sikkim	Market-oriented	140	117	113	91	131	110
	Own use	239	127	185	92	220	113
Tamil Nadu	Market-oriented	219	169	185	166	201	167
	Own use	133	84	112	126	123	108
Telangana	Market-oriented	280	207	167	155	250	197
	Own use	103	73	95	46	101	64
Tripura	Market-oriented	106	85	93	69	100	78
	Own use	75	70	101	63	90	66
Uttar Pradesh	Market-oriented	152	142	144	139	148	141

States	Livestock Activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
	Own use	120	101	127	103	123	102
Uttarakhand	Market-oriented	140	205	56	182	119	190
	Own use	123	98	118	99	120	99
West Bengal	Market-oriented	192	129	111	107	152	116
	Own use	106	69	77	79	89	76
All UTs	Market-oriented	134	139	105	136	131	138
	Own use	80	79	47	80	70	80

Source: Same as above.

Livestock Activities Intensity and Gendered Time Use across Socioeconomic Groups

Table 7 reinforces the core time-use finding of the study: livestock remains a gendered domain of work, particularly for women from socially and economically disadvantaged groups, even as the sector shows signs of gradual commercialization. Across social groups, men's time use in market-oriented livestock activities has either stagnated or declined between 2019 and 2024, whereas women's time has remained stable or increased marginally, leading to a modest narrowing of gender gaps. This pattern is consistent with earlier results showing that women's growing engagement in market-oriented livestock activities is incremental rather than transformative and does not necessarily imply corresponding increases in paid work or control over income.

The decline in time use on own-use livestock activities across all social groups aligns with the broader time-use evidence of a slow shift away from subsistence activities. However, this transition is uneven. Scheduled Tribe, Scheduled Caste, and Other Backward Classhouseholds continue to devote substantial time to livestock, underscoring its role as a livelihood buffer in contexts of limited nonfarm opportunities. Importantly, women in these groups continue to spend significant time in livestock activities, reflecting the persistence of unpaid and under-recognized labor highlighted earlier.

Religious and educational differentials further mirror the aggregate time-use patterns. Lower educational attainment is associated with higher time intensity in livestock activities for both men and women, suggesting that livestock absorbs labor where access to alternative employment is constrained. Notably, women's time in livestock activities declines far less steeply with education than men's, reinforcing the finding that education alone does not significantly reduce women's work burden.

Landholding patterns also corroborate earlier results: marginal and small farmers, especially women, devote more time to livestock activities than medium and large farmers. This confirms livestock's role as a supplementary income source for land-poor households and explains why women's labor remains concentrated in this sector.

Overall, Table 7 strengthens the central argument of the paper: while livestock is emerging as an avenue for income diversification, women's increasing time contribution is not matched by commensurate gains in paid work, recognition, or reduction in unpaid labor. Without targeted interventions to improve productivity, market access, and control over returns, women's expanding role in livestock risks reinforcing, rather than alleviating, existing gender inequalities.

Table 7: Changes in time use in livestock activities (minutes per day) for rural individuals by social group, religion, education, and land category

Category	Livestock activities	Men		Women		All	
		2019	2024	2019	2024	2019	2024
Social Group							
Scheduled Tribe	Market-oriented	152	156	125	125	140	142
	Own use	123	104	108	101	116	103
Scheduled Caste	Market-oriented	177	153	132	137	155	144
	Own use	116	90	124	107	120	99
Other Backward Class	Market-oriented	183	160	138	143	162	152
	Own use	117	100	114	108	115	104
Others	Market-oriented	160	156	124	132	144	145
	Own use	120	102	109	104	114	103
Religion							
Hinduism	Market-oriented	173	157	135	138	156	148
	Own use	119	99	118	107	118	103
Islam	Market-oriented	175	174	97	144	140	157
	Own use	118	91	92	93	104	92
Christianity	Market-oriented	180	179	150	165	164	173
	Own use	114	104	89	88	105	97
Sikhism	Market-oriented	159	134	129	124	145	129
	Own use	128	126	91	118	107	122
Others	Market-oriented	169	152	77	153	138	152
	Own use	80	131	91	84	86	109
Education Category							
Not literate	Market-oriented	198	194	140	155	162	167
	Own use	127	106	123	116	124	114
Up to Primary	Market-oriented	176	158	129	139	154	148
	Own use	117	99	111	105	114	102
Upper Primary/Middle	Market-oriented	167	156	129	121	153	142
	Own use	119	98	102	98	112	98
Secondary Education	Market-oriented	157	141	122	113	145	132
	Own use	114	96	101	92	109	94
Graduate and Above	Market-oriented	149	142	114	116	141	136
	Own use	107	95	107	90	107	93
Land Category							
Marginal	Market-oriented	176	159	131	138	155	149
	Own use	119	99	114	105	116	102
Small	Market-oriented	182	156	148	137	167	148
	Own use	119	105	117	106	118	106
Medium	Market-oriented	138	152	126	137	133	146
	Own use	115	91	107	111	111	102
Large	Market-oriented	151	146	124	139	137	143
	Own use	109	91	117	115	113	105

Source: Same as above.

Determinants of Shifts in Rural Time Use Patterns in Livestock by Rural Men, 2019–2024

Tables 8 and 9 jointly examine the determinants of changes in time use on livestock activities among rural working-age men and women between 2019 and 2024. Read together, the results reinforce the central time-use finding of the paper, that is, livestock is increasingly important in rural labor portfolios, but the nature and drivers of engagement differ sharply by gender.

For both men and women, the positive and significant year effect in total livestock and livestock activities equations confirms an overall increase in time devoted to livestock activities over the period. However, for both genders, the year coefficient is not significant for own-use livestock activities, indicating that the observed increase is driven primarily by market-oriented work

rather than subsistence expansion. This aligns with earlier descriptive evidence of a gradual, though uneven, commercialization of livestock activities.

Age and marital status are positively associated with livestock activities intensity for both men and women, reflecting the role of livestock as a responsibility-intensive activity embedded within household livelihood strategies. Household size shows a stronger and more consistent positive association for women than for men, particularly in own-use livestock activities, underscoring women's disproportionate responsibility for labor-intensive, household-based livestock tasks.

Education exhibits a strong and monotonic negative relationship with livestock activities for both genders, but the magnitude is notably larger for women. As educational attainment rises, women sharply reduce time use in livestock activities—both market-oriented and own-use—suggesting that livestock remains a fallback activity for women with limited education and employment options. This result mirrors the aggregate time-use findings that women's labor in livestock is closely tied to constrained opportunity structures rather than choice.

Economic status and asset ownership affect men and women differently. Land ownership is a powerful positive determinant of livestock activities for both genders, but the effect is stronger for men in market-oriented activities and for women in own-use activities. This asymmetry reflects gendered control over productive assets. In other words, men are more likely to engage in market-oriented livestock activities, while women's engagement is confined to household-based roles. Consumption expenditure more strongly associated with women's livestock activities than men's, indicating that women's labor input may rise with household economic capacity, possibly due to intensification rather than diversification.

Agroecological region effects reveal pronounced spatial heterogeneity, particularly for women. Across most regions, women spend significantly more time in own-use livestock activities, while men's time is more closely linked to market-oriented work. These regional patterns resonate with earlier state-level results showing uneven transitions across India's livestock systems.

Taken together, Tables 8 and 9 deepen the paper's core argument that the intensification of livestock activities is occurring along gendered lines. Men's increased engagement reflects asset ownership and market access, whereas women's rising time commitments, though visible, remain largely embedded in unpaid or low-return segments. Without explicit policy efforts to improve women's access to livestock assets, extension services, and output markets, the expansion of livestock activities risks reinforcing existing gender inequalities rather than translating women's labor into economic empowerment.

Table 8: Determinants of time use in livestock activities by rural men in India, 2019 and 2024

Explanatory variables	(1) Total	(2) Total	(3) Market-oriented	(4) Market-oriented	(5) Own use	(6) Own use
Year: (2024 = 1 & 2019=0)	0.191***	0.173***	0.143***	0.124***	0.051	0.051
	(0.049)	(0.050)	(0.027)	(0.025)	(0.049)	(0.051)
Age: (Log)		0.590***		0.190***		0.408***
		(0.081)		(0.021)		(0.073)
Household Size (Log)		0.040		0.053***		-0.010
		(0.029)		(0.014)		(0.024)
Marital Status: (Base: Never Married)						
Currently married		0.100***		0.034**		0.068***
		(0.018)		(0.014)		(0.016)
Social Category: (Base: Others)						
Scheduled Tribe		0.037		-0.068*		0.109*
		(0.078)		(0.040)		(0.055)
Scheduled Caste		-0.175***		-0.082**		-0.096***
		(0.053)		(0.035)		(0.030)
Other Backward Class		0.021		-0.001		0.022
		(0.060)		(0.039)		(0.038)
Religion: (Base: Others)						
Hinduism		0.009		0.027		-0.012
		(0.064)		(0.044)		(0.037)
Islam		-0.272***		-0.053		-0.216***
		(0.088)		(0.040)		(0.078)
Education: (Base: No Formal Education)						
Up to Primary		-0.085**		-0.050***		-0.038
		(0.039)		(0.018)		(0.027)
Upper Primary/Middle		-0.102**		-0.046**		-0.060**
		(0.042)		(0.022)		(0.030)
Secondary		-0.191***		-0.096***		-0.099***
		(0.049)		(0.027)		(0.035)
Graduate and Above		-0.405***		-0.188***		-0.222***
		(0.055)		(0.032)		(0.047)
Monthly per Capita Consumption Expenditure (Log)		0.055*		0.050***		0.006
		(0.029)		(0.018)		(0.019)
Land Possessed: (Base: Marginal<1ha)						
Small :1-2 ha		0.349***		0.127***		0.222***
		(0.031)		(0.027)		(0.029)
Medium: 2-4 ha		0.378***		0.119***		0.256***
		(0.040)		(0.043)		(0.041)
Large: >4 ha		0.378***		0.186**		0.197***
		(0.057)		(0.072)		(0.033)
Dwelling Type: (Base: Katcha)						
Semi pucca		0.004		-0.002		0.008
		(0.027)		(0.009)		(0.026)
Pucca		-0.070*		-0.018		-0.054
		(0.035)		(0.014)		(0.039)
Agroecological Zone (Base: Arid)						
Coastal		-0.041		-0.215***		0.180***
		(0.047)		(0.057)		(0.042)

Explanatory variables	(1) Total	(2) Total	(3) Market-oriented	(4) Market-oriented	(5) Own use	(6) Own use
Hill & Mountain		0.077		-0.049		0.139***
		(0.064)		(0.060)		(0.041)
Irrigated		-0.018		-0.070		0.058
		(0.065)		(0.055)		(0.060)
Rainfed		0.063***		-0.082*		0.152***
		(0.020)		(0.046)		(0.036)
State FE		Yes		Yes		Yes
Constant	0.560***	-1.459***	0.149***	-0.969***	0.418***	-0.551*
	(0.077)	(0.408)	(0.024)	(0.215)	(0.083)	(0.289)
Observations	199,023	198,048	199,023	198,048	199,023	198,048
R-squared	0.003	0.079	0.005	0.034	0.000	0.075

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log daily time use (minutes) in livestock activities. Columns (1), (3), and (5) include only the year indicator; columns (2), (4), and (6) include full controls.

Table 9: Determinants of time use in livestock activities by rural women in India, 2019 and 2024

Explanatory variables	(1) Total	(2) Total	(3) Market-oriented	(4) Market-oriented	(5) Own use	(6) Own use
Year: (2024 = 1 & 2019=0)	0.208***	0.191**	0.144***	0.137***	0.066	0.056
	(0.072)	(0.078)	(0.028)	(0.029)	(0.071)	(0.076)
Age: (Log)		0.545***		0.203***		0.353***
		(0.093)		(0.031)		(0.080)
Household Size (Log)		0.072***		0.030***		0.044**
		(0.022)		(0.011)		(0.021)
Marital Status: (Base: Never Married)						
Currently married		0.080*		-0.003		0.084**
		(0.042)		(0.011)		(0.035)
Social Category: (Base: Others)						
Scheduled Tribe		0.006		-0.070**		0.076
		(0.065)		(0.029)		(0.075)
Scheduled Caste		-0.090		-0.046		-0.048
		(0.056)		(0.028)		(0.037)
Other Backward Class		0.040		0.011		0.028
		(0.050)		(0.023)		(0.038)
Religion: (Base: Others)						
Hinduism		-0.001		-0.019		0.019
		(0.051)		(0.036)		(0.037)
Islam		-0.177*		-0.061		-0.118
		(0.088)		(0.040)		(0.088)
Education: (Base: No Formal Education)						
Up to Primary		-0.169***		-0.046***		-0.127***
		(0.031)		(0.013)		(0.025)
Upper Primary/Middle		-0.214***		-0.059***		-0.160***
		(0.036)		(0.014)		(0.027)
Secondary		-0.355***		-0.102***		-0.258***
		(0.054)		(0.018)		(0.045)
Graduate and Above		-0.609***		-0.203***		-0.414***
		(0.077)		(0.025)		(0.070)
Monthly per Capita Consumption Expenditure (Log)		0.121***		0.033**		0.088***
		(0.032)		(0.013)		(0.025)

Explanatory variables	(1) Total	(2) Total	(3) Market-oriented	(4) Market-oriented	(5) Own use	(6) Own use
Land Possessed:						
(Base: Marginal<1ha)						
Small :1-2 ha		0.244***		0.080***		0.164***
		(0.055)		(0.023)		(0.047)
Medium: 2-4 ha		0.300***		0.085***		0.213***
		(0.076)		(0.029)		(0.066)
Large: >4 ha		0.327**		0.132		0.197***
		(0.128)		(0.085)		(0.062)
Dwelling Type:						
(Base: Katcha)						
Semi pucca		-0.055		-0.015		-0.041
		(0.038)		(0.014)		(0.035)
Pucca		-0.088**		-0.025		-0.063*
		(0.036)		(0.016)		(0.037)
Agroecological Zone						
(Base: Arid)						
Coastal		0.272***		-0.144*		0.430***
		(0.076)		(0.078)		(0.087)
Hill & Mountain		0.266***		-0.076		0.355***
		(0.071)		(0.065)		(0.079)
Irrigated		0.238***		-0.030		0.282***
		(0.053)		(0.054)		(0.074)
Rainfed		0.255***		-0.091		0.359***
		(0.031)		(0.062)		(0.078)
State FE		Yes		Yes		Yes
Constant	0.569***	-2.056***	0.119***	-0.846***	0.457***	-1.258***
	(0.112)	(0.420)	(0.027)	(0.191)	(0.106)	(0.374)
Observations	204,857	203,894	204,857	203,894	204,857	203,894
R-squared	0.004	0.143	0.006	0.044	0.001	0.131

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log daily time use (minutes) in livestock activities. Columns (1), (3), and (5) include only the year indicator; columns (2), (4), and (6) include full controls.

Sources of Time Use Change Based on Gelbach Decomposition

Tables 10 and 11 decompose the observed changes in livestock-related time use between 2019 and 2024 for rural working-age men and women. Two consistent patterns emerge. First, age and education account for a substantial share of the explained change for both genders. Age contributes positively, indicating that livestock activities remain concentrated among older cohorts, while education contributes negatively, confirming that livestock continues to function as a fallback activity as human capital and alternative opportunities expand.

Second, economic capacity matters more for women than for men. Monthly per capita expenditure (MPCE) explains a significant share of the increase in women's livestock time, particularly in own-use activities, suggesting intensification of household-based livestock activities rather than a shift toward market engagement. For men, MPCE contributes mainly to market-oriented livestock activities, consistent with asset- and market-driven participation.

Household size modestly increases women's livestock time, reinforcing their caregiving and household production roles. Overall, the decompositions show that increases in women's livestock time is driven by household needs and economic pressure, whereas men's engagement reflects market participation..

Table 10: Gelbach decompositions of time use in livestock activities by rural men in India, 2019 and 2024

Explanatory variables	(1) Total	(2) Market-oriented	(3) Own use
Age	0.010***	0.003***	0.007***
	(0.003)	(0.001)	(0.002)
Household Size	0.001	0.002**	-0.001
	(0.001)	(0.001)	(0.001)
Married	0.000	0.000	0.000
	(0.001)	(0.000)	(0.001)
Social Category	-0.000	-0.000	-0.000
	(0.002)	(0.001)	(0.001)
Religion	-0.000	-0.000	-0.000
	(0.001)	(0.000)	(0.001)
Education	-0.018***	-0.009***	-0.010***
	(0.004)	(0.002)	(0.003)
MPCE	0.019*	0.015***	0.005
	(0.010)	(0.006)	(0.008)
Land Possessed	0.004	0.002	0.002
	(0.004)	(0.002)	(0.002)
Dwelling	-0.008***	-0.003	-0.006*
	(0.003)	(0.002)	(0.003)
Agroecological Zone	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)
State	0.000	-0.001	0.001
	(0.005)	(0.002)	(0.004)
Total Predicted Change	0.008	0.010	-0.001
	(0.011)	(0.006)	(0.009)
Observations	198,092	198,092	198,092

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11: Gelbach decompositions of time use in livestock activities by rural women in India, 2019 and 2024

Explanatory variables	(1) Total	(2) Market-oriented	(3) Own use
Age	0.006***	0.002***	0.004***
	(0.001)	(0.001)	(0.001)
Household Size	0.003**	0.001***	0.002
	(0.001)	(0.000)	(0.001)
Married	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Social Category	0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)
Religion	-0.000	-0.000	0.000
	(0.001)	(0.000)	(0.001)
Education	-0.032***	-0.010***	-0.022***
	(0.006)	(0.002)	(0.004)
MPCE	0.038***	0.010**	0.028***
	(0.009)	(0.005)	(0.007)
Land Possessed	0.003	0.001	0.002
	(0.004)	(0.001)	(0.002)
Dwelling	-0.006**	-0.002*	-0.004
	(0.003)	(0.001)	(0.003)
Agroecological Zone	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)
State	0.002	-0.002	0.003
	(0.005)	(0.002)	(0.004)
Total Predicted Change	0.013	0.001	0.012*
	(0.010)	(0.005)	(0.007)

Explanatory variables	(1) Total	(2) Market-oriented	(3) Own use
Observations	203,942	203,942	203,942

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Conclusion and Policy Implications

This paper provides one of the first nationally representative assessments of changes in women's work in livestock raising in India using Time Use Survey data for 2019 and 2024. The analysis reveals a pattern of continuity with incremental change. Women's participation in market-oriented activities has increased modestly, but this expansion has occurred alongside a persistently heavy burden of unpaid domestic and care work. Within agriculture, livestock emerges as a distinct domain where women's participation has increased more visibly than in crop cultivation in terms of both incidence and time use.

Importantly, the findings suggest a gradual shift from purely subsistence-oriented livestock activities toward market-oriented engagement, with women increasingly participating in commercial livestock activities across several states and agroecological zones. However, this transition remains uneven and deeply gendered. While men's increased involvement is closely associated with asset ownership and market access, women's rising time commitment is still concentrated in low-return, informal, and often unpaid segments of livestock production. Some of this labor may, however, be compensated for indirectly or in-kind within household enterprises and may not be fully captured as paid work in the data.

The econometric and decomposition analyses reinforce these conclusions. Education reduces time use in livestock activities for both men and women, but the effect is stronger for women, indicating that livestock remains a fallback activity under constrained employment options. Household size and consumption expenditure matter more for women, pointing to intensification of household-based livestock activities driven by economic necessity rather than empowerment. Taken together, the evidence challenges simplistic narratives of the "feminization of agriculture" by showing that women's growing role in livestock does not automatically translate into improved economic outcomes or reduced work burdens.

The findings carry several important policy implications. First, recognition of women's work in livestock must be strengthened. Women's substantial contribution, particularly in own-use and semi-commercial activities, remains undercounted in official statistics and undervalued in policy design. Improving gender-sensitive measurements of livestock labor is a necessary first step toward informed interventions.

Second, livestock development policies must move beyond productivity alone and explicitly address gendered access to assets, services, and markets. Women's growing participation in market-oriented livestock activities suggests untapped potential, but this will remain limited unless women gain secure access to livestock assets, credit, veterinary services, control over income, and participation in producer organizations. Strengthening women's membership and leadership in dairy cooperatives, self-help groups, and farmer–producer organizations is especially critical.

Third, the persistence of high, unpaid labor burdens highlights the need to integrate livestock policy with care-economy interventions. Labor-saving technologies (such as fodder choppers, water access, and housing for animals), improved access to childcare, and basic rural infrastructure can significantly reduce women's time constraints and enable meaningful participation in markets.

Finally, policy responses must be region- and group-specific. In poorer, rainfed, hill, and tribal regions where livestock functions as a livelihood buffer, interventions should focus on risk reduction, small ruminants, backyard poultry, and nutrition-sensitive livestock systems. In commercially advanced regions, policies should prioritize women's control over returns from livestock commercialization rather than merely expanding participation.

In sum, livestock shows considerable promise as a pathway for women's economic inclusion in rural India. Realizing this potential, however, requires shifting from viewing women as auxiliary labor to recognizing them as economic agents, with corresponding rights, resources, and institutional support.

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