

Socio-Economic Impacts of Stray Cattle on Agricultural Productivity in Bareilly Division, Uttar Pradesh, India

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Abstract

The rising incidence of stray cattle poses a serious challenge to agricultural sustainability and rural livelihoods in northern India, especially Uttar Pradesh. This study examines their socio-economic effects on agricultural productivity in the Bareilly Division, covering Bareilly, Badaun, Shahjahanpur, and Pilibhit districts. Using multistage purposive sampling, four districts with frequent stray cattle-related crop damage were selected. A mixed-method design assessed crop damage, economic losses, and social impacts among farming households. Questionnaires, field observations, and semi-structured interviews with 280 farmers were used to get first-hand information. Quantitative data were analyzed descriptively using Pearson correlation, multiple regression, ANOVA and t-tests. Qualitative data were analyzed thematically.

Economic loss was estimated from farmers' self-reported crop damage in the most recent agricultural season. For each respondent, crop quantity lost to stray cattle grazing and trampling was multiplied by the local farm-gate price of the crop, and losses across affected crops were summed. Average loss was calculated by dividing total estimated losses by the number of surveyed farmers.

The data indicate that some farmers have encountered recurring crop failure with wheat, mustard, sugarcane, potato and vegetables being the worst affected. The average economic loss was roughly 38,000 rupees per farmer every season with the largest loss in Bareilly district. The number of cattle was positively connected with crop damage ($r = 0.656$, $p < 0.001$) and the amount of cultivated land and the number of animals explained a considerable part of the variation in the losses ($R^2 = 0.701$, $p < 0.001$). Farmers also reported greater work demands, stress, interrupted sleep due to night guarding and decreased agricultural efficiency.

The study highlights the conflict between livestock management and agricultural production and recommends stronger cattle shelters, livestock identification, farmer compensation, and community-based management to reduce losses and improve rural resilience. Unlike earlier policy-focused or state-level studies, this research offers the first comprehensive multi-district empirical assessment of stray cattle's socio-economic impacts on agricultural productivity in the Bareilly Division using field survey data and statistical analyses.

Keywords: Stray cattle; Agricultural productivity; Crop damage; Rural livelihoods; Socio-economic impact; Livestock management; Sustainable agriculture; Human–livestock conflict,

1. Introduction

Agriculture is an essential component of the rural economy of India, providing employment to around half the population and contributing to food security and economic growth (Singh, 2026). But biotic and socio-economic difficulties are diminishing the safety of the produce. The problem of stray cattle is developing in north India (Ayman et al., 2022). This problem is very serious in Uttar Pradesh where animals left alone destroy crops by grazing and trampling, making rural households' life hard in economic, social and emotional ways (Ayman et al., 2022). Cattle are an integral part of Indian culture, religion and economy (P et al., 2024) providing milk, draft power and manure. However, the management of animals has altered due to the development of technology, the reduced usage of pulling animals and the increased costs of upkeep (Huyen et al., 2018, p. 3). Many old or unproductive cattle are being left behind, a scenario compounded by restrictions against killing, poor shelters and lack of management resources (Joshi et al., 2020). This often causes straying cattle to enter towns and fields and destroy crops while they are still growing. In Uttar Pradesh, the problem of stray cattle destroying crops is very acute (Kumar et al., 2022, p. 2). This is especially the case around roads, the edges of towns and regions of pasture. Losses are tracked from seedling to harvest (Kumar et al., 2022, p. 10). Vegetables, potatoes, wheat, mustard and sugar cane are anticipated to be the worst hit. Repeated damage lowers income, raises risk, discourages investment and requires farms to spend more on fencing, night guards and other safety measures.

Loose cattle are a problem for everyone and they cost money. Farmers and family members laboring in the fields often cannot sleep at night (Jakobsen & Nielsen, 2024, p. 67). This makes individuals tired, anxious and reduces their quality of life. Disputes about who is responsible for crop damage can lead to a lack of cohesion in villages (Galley & Anthony, 2024, p. 598), and women and older family members may have to do extra work when others are protecting the fields. The government has taken several initiatives, including gaushalas, animal welfare programs and community livestock management systems (Ayman et al., 2022). But lack of infrastructure, funding and watchdogs limits their efficacy and the number of livestock is increasing (Pérez-Lombardini et al., 2024, p. 2). However, there is a gap between legislation and implementation as many shelters are overcrowded and many animals are still roaming farms (Temple & Manteca, 2020, p. 12).

Livestock has been shown to result in agricultural losses and problems for farmers (Karanth & Vanamamalai, 2020, p. 9). But there is little empirical research on the volume and socio-economic impact of stray cattle in this area (Thakur et al., 2022). In Bareilly Division, studies on association between number of animals, area under farming and crop damage is fairly less (Kumar et al., 2015). We need this kind of research to set policies that safeguard animals and also maintain long term health of farms.

It is an important agricultural region with a significant population depending on agriculture and several different types of crops (Verma et al., 2021). It contains Bareilly, Badaun., Shahjahanpur and Pilibhit. In the area, stray cattle are reportedly a continuous threat to agricultural output, and there are few rigorous scientific studies into their social and economic impacts.

Therefore, the present study is on the crop damage by stray animals and its socio-economic implications on the farming households in Bareilly Division, Uttar Pradesh (Jakobsen & Nielsen, 2024, p. 67). The specific objectives are to quantify the level of crop loss, to establish the contribution of the number of cattle to crop damage, to establish the economic and social implications on farmers and to develop policy recommendations for implementation. The findings can contribute to the current body of knowledge regarding the interaction between humans and animals and can assist policy makers, agricultural planners and rural development agencies to operate farms in a sustainable manner.

2. Review of Literature

Animals that roam freely on land are a problem that has recently been receiving greater attention since they affect rural life, food security and long-term agricultural progress (Khairi et al., 2021). The environmental, economic and social effects of relationships between people and animals have been studied in several research initiatives, especially in areas where roaming dogs commonly enter farms (Sekaran et al., 2021).

In a number of developing countries, losses in agriculture have been blamed on grazing animals. Uncontrolled domestic and wild animals can induce serious changes in agricultural landscapes, impair crop production, and generate conflicts between conservation objectives and livelihood strategies of rural people (Bonacic et al., 2019). The authors' analysis demonstrated that good management of cattle is crucial such that the economic losses are less without compromising animal health. This also applies to farming methods in South Asia, where an excess of animals usually means less food is produced and more costs to run the farms.

The problem of stray animals is on the rise in India. This is notably true in the northern states like Uttar Pradesh,

Rajasthan, Madhya Pradesh and Haryana (Ramankutty et al., 2018, p.). As Sharma (2018) says, “changes in policies concerning trade of livestock and slaughter of animals have indirectly led to an increase in the number of abandoned cattle.” The study revealed that farmers find it difficult to keep wild animals away from standing crops. This is costing the economy money directly and indirectly (Kelly et al., 2015, p. 16). The author also highlighted the value of having fair policies that protect animals and are environmentally beneficial in agriculture.

(Singh & Verma, 2020) investigated the effect of stray cattle to agriculture in Uttar Pradesh and discovered that harvests of wheat, mustard and vegetables were severely affected. They observed that cattle were more inclined to enter the fields that were farmed along the outskirts of villages and on traffic routes. The poll also showed that farmers devoted a lot of time and effort to field security measures such as fencing and night-time crop surveillance (Angela et al., 2014, p. 642). These higher charges reduced the net income of the farm and raised the costs of produce.

The impacts of wandering livestock on society and the economy are not just losses in agriculture. Gupta and Ali (2021) explored the impact of frequent crop failure on rural families and found that farmers experienced financial instability, emotional stress and lack of trust in farming activities. How often crops fail influences decisions by farmers about what to plant, how much land to farm and how much they will invest in farming in the future. Such effects could damage the security of rural economies and the output of farms for a long period (Xu et al., 2021:25).

To address the increasing problem of stray cattle, the government has built up cow shelters, livestock care projects and community management programmes. But these solutions have not addressed the problem of stray animals in farming areas, which has long been an issue. This means there are still a lot of stray cattle running free in the country areas and this generates problems for farming communities.

Much study has been done on the stray cattle problem in the past, but much of it has been limited to policy or state level evaluation. There has been less empirical quantitative research at the district or regional level on the relationship between the number of cattle, the size of the landholding and crop damage (Jakobsen & Nielsen, 2024, p. 67).

Moreover, it is not very often that you can obtain in-depth evaluations with economic, social and statistical portions of the issue (Daniel et al., 2021).

Objectives of the Study: The present study was conducted with the following objectives

- **To assess the extent of crop damage caused by stray cattle** in the agricultural fields of the Bareilly Division, Uttar Pradesh.
- **To evaluate the economic losses incurred by farmers** as a result of stray cattle-induced crop destruction.
- **To identify the crop types most vulnerable to stray cattle attacks** and examine the factors influencing their susceptibility.
- **To analyze the relationship between cattle abundance, landholding size, and crop damage** using statistical methods.
- **To examine the social and psychological impacts of stray cattle on farming households**, including labour burden, stress, and changes in farming practices.
- **To evaluate the effectiveness of existing coping strategies and government interventions** adopted to mitigate crop losses caused by stray cattle.
- **To propose sustainable management and policy recommendations** for reducing agricultural losses while ensuring animal welfare and rural livelihood security.

3. Materials and Methods

3.1 Study Area

The present study was carried out in Bareilly Division of Uttar Pradesh, India covering the districts of Bareilly, Badaun, Shahjahanpur and Pilibhit. The region is largely agricultural and agriculture is the major source of subsistence for a big segment of the rural population. The main crops of the study region are wheat, mustard, sugarcane, potato, paddy and several types of vegetables. Indeed, farmers in these areas have been reporting increased incidents of crop damage by stray cattle in recent years, which makes the region suitable for studying the socio-economic implications of livestock-related crop losses (Kshetry et al., 2021, p. 3).

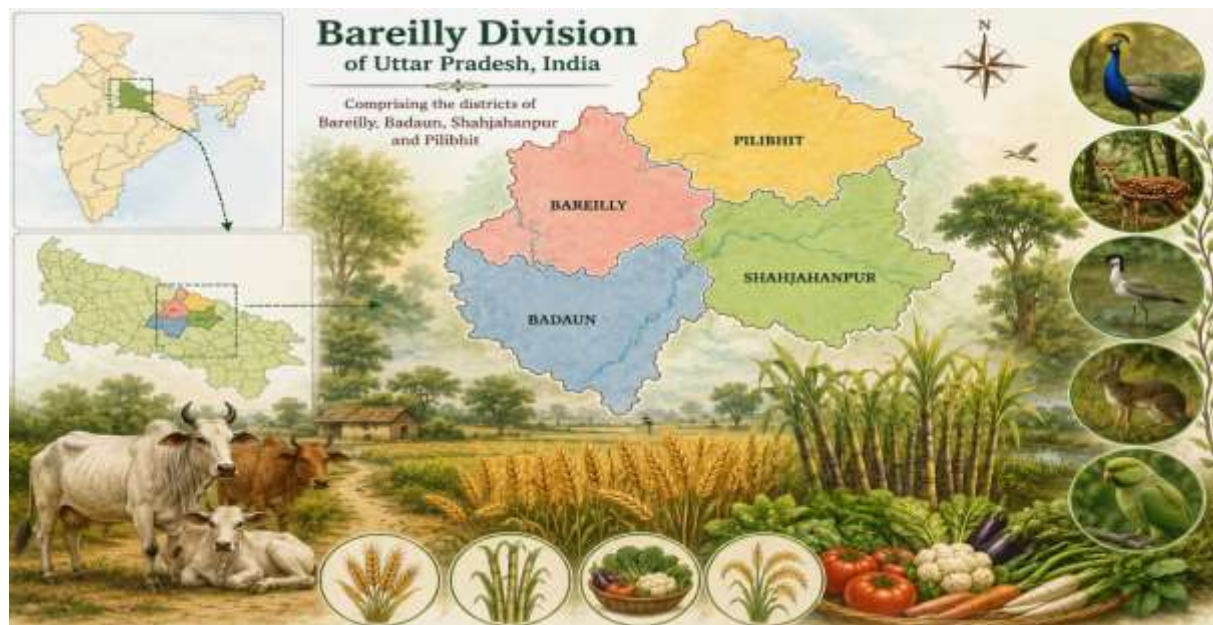


Fig: 1 Location Major crops cultivated and damage

3.2 Research Design

The research utilized a mixed method approach of quantitative and qualitative methodologies to enable a thorough comprehension of the problem (Kshetry et al., 2021, p.3). The study used descriptive and analytical research design to determine the level of crop damage, economic losses and social repercussions related with stray cattle (Nuvey et al., 2020, p. 828). Quantitative data were utilized to quantify the size of losses and to establish statistical connections, while qualitative data provided insights into the farmers' experiences, attitudes and coping techniques (Nyirenda et al., 2013).

3.3 Sampling Procedure and Sample Size

The study employed multistage purposive sampling technique. The reason for using this sampling technique was because the study intended to evaluate the socio-economic repercussions of stray cattle on farmers that had firsthand experience of crop damage. As a large proportion of the farmers in the study area had not suffered losses due to stray cattle and could not give information relevant to the research objectives, the probability sampling was regarded less acceptable. Purposive sampling was used to pick information-rich individuals with first-hand knowledge of the topic. In the first stage four districts, viz., Bareilly, Badaun, Shahjahanpur and Pilibhit were purposively picked as these districts constitute the major agricultural belt of the Bareilly Division and have always reported incidences of crop damage caused by stray cattle. In the second stage, villages were selected on the following basis (i) frequent incidence of stray cattle intrusion as reported by local agricultural officers and village authorities (ii) dominance of crop-based farming systems (iii) accessibility for field surveys and (iv) willingness of local community to participate in the study. Farmers were selected from the selected villages based on the following inclusion criteria: (i) active farmer during the study period; (ii) resident of the selected village for at least two years; (iii) cultivated agricultural land during the last cropping season; and (iv) experienced crop damage by stray cattle personally. Exclusion criteria were farmers who did not suffer any crop loss due to wandering cattle, Tenant labourers who do not have their own farming operations, respondents who were not prepared to provide informed permission and questionnaires with incomplete or inconsistent responses.

Sample size estimation: The sample size was estimated by the sample size formula by Cochran (1977) for big populations:

$$n_0 = \frac{Z^2 pq}{e^2}$$

where $Z = 1.96$ (95 percent confidence level), $p = 0.50$ (maximum variability), $q = 1 - p = 0.50$, and $e = 0.06$ (6 percent margin of error). The estimated minimum sample size was about 267 respondents. Finally, 280 farmers were interviewed to increase the statistical reliability and to cover probable non-response or incomplete questionnaires. The final sample consisted of 130 farmers from Bareilly, 120 from Badaun, 20 from Shahjahanpur and 10 from Pilibhit.

3.4 Data Collection

To study the social and psychological repercussions of stray cattle on farming households, semi-structured interviews and focus group discussions were also undertaken. Crop damage was confirmed by field observations and local management strategies were evaluated.

Secondary data were acquired from government papers, animal census records, publications of the agricultural department, scientific journals and other relevant literature on livestock management and agricultural productivity. Primary data were obtained via field surveys, personal interviews and direct observations in the period 2025-2026. A structured questionnaire was developed to collect data on:

- Demographic features of farmers
- Cropping patterns and landholding size
- Number and frequency of stray cattle infiltration.
- Type and level of crop damage
- Estimated economic losses
- Coping and protection techniques
- Perceptions of government involvement

Questionnaire Development and Validation

A detailed literature analysis was conducted on stray cattle management, crop damage, agricultural production and rural livelihoods and a standardized questionnaire was constructed. The questionnaire was composed of five sections: (i) socio-demographic characteristics of farmers; (ii) farm and cropping characteristics; (iii) frequency and extent of stray cattle intrusion; (iv) crop damage and economic losses; and (v) farmers' perceptions, coping methods, and government interventions. Most items were closed-ended with a mixture of multiple-choice, dichotomous and 5-point Likert scale questions, with some open-ended questions added so as to gain additional qualitative information. The questionnaire was pilot tested on 30 farmers from a village outside the final study sample to test the clarity, relevance, sequence and comprehensibility of the questions prior to the final survey. Based on input from responders, the phrasing was clarified, redundant questions were eliminated and the overall structure was improved for consistency and readability. The data from the pilot study were not included in the final analysis.





Fig:2 Group of Cattle Crop Damage Level

Expert review was used to verify content veracity. The draft questionnaire was assessed by five experts in the fields of agricultural economics, rural sociology, animal husbandry and agricultural extension. Experts evaluated each item on relevancy, clarity, adequacy and topic coverage. Their recommendations were built into the instrument before it was finalized.

Reliability of the questionnaire was determined by calculating Cronbach's alpha coefficient. The total questionnaire displayed acceptable reliability (Cronbach's $\alpha = 0.84$) and satisfactory internal consistency for socio-economic survey research.

3.5 Variables Considered

Dependent Variable

- Crop damage (quintals per crop and estimated economic loss)

Independent Variables

- Total cattle population
- Number of male cattle
- Number of female cattle
- Cultivated land area (acres)
- Crop type
- District-wise location

3.6 Data Analysis

Collected data were entered into Microsoft Excel and statistically analyzed using standard quantitative techniques. Data cleaning procedures included the removal of incomplete records and standardization of non-numeric responses. Statistical significance was assessed at a 95% confidence level ($\alpha = 0.05$).

3.7 Ethical Considerations

Participation in the study was voluntary. Prior informed consent was obtained from all respondents before data collection. Farmers were assured of confidentiality, anonymity, and the exclusive use of information for academic and research purposes. Personal identifiers were removed during data processing to maintain respondent privacy.

3.8 Limitations of the Study

The study was limited to selected districts of the Bareilly Division and may not fully represent conditions in other regions of Uttar Pradesh. Estimates of crop losses were partly based on farmers' self-reported information and may be subject to recall bias. Seasonal variations and annual fluctuations in stray cattle populations could also influence the extent of observed crop damage.

4. Results

The study says that wild animals are a major challenge for farming in the Bareilly Division of Uttar Pradesh. Nearly 86.7% of the 280 farmers polled reported they lost crops regularly due to grazing and damage by stray animals. Wheat, mustard, sugarcane, potatoes and vegetables were the crops most affected since they taste well and are easy to procure. A survey by the district has revealed that the highest crop loss was in Bareilly followed by Badaun, Shahjahanpur and Pilibhit, district-wise. Each farmer was estimated to have suffered a loss of roughly ₹38,417 in sales every agricultural season. This demonstrates that farming households are under a great deal of financial stress. Farmers also claimed that temporary fencing, overnight field patrols and other procedures to preserve crops cost extra money. Also, over 60% of those polled felt that the government was not doing enough in the current actions. They reported that there were no good rules to manage stray cattle and individuals had difficulty to enter public shelters (Khanam et al., 2022, p. 166). Statistics indicated there was a close correlation between the quantity of animals and damage to crops. The result of Pearson's correlation coefficient demonstrated a high relationship between the quantity of animals and crop loss ($r = 0.656$, $p < 0.001$). This means the more cattle, the more danger of agricultural harm. The multivariate linear regression analysis indicated that the size of the planted fields and the number of animals in the area explained 70.1% of the changes in crop damage ($R^2 = 0.701$, $p < 0.001$).

One-way ANOVA on log-transformed data revealed significant differences in crop damage between herd-size groups ($F = 7.19$, $p = 0.001$). More cattle equals more strain on agricultural fields. A paired t-test of male vs female cows showed a significant difference ($t=2.63$, $p=0.0091$). There were more of the bull cows, and that could spell additional pressure on the grasslands. All these results support the hypothesis that stray cattle are a major cause of agricultural losses and farmer stress in the study area.

Table 1. District-wise Distribution of Surveyed Farmers and Crop Damage

District	n	Percentage (%)	Relative crop damage	Major crops affected
Bareilly	130	46.4	High	Wheat, Mustard, Sugarcane, Vegetables
Badaun	120	42.9	Moderate	Wheat, Mustard, Potato
Shahjahanpur	20	7.1	Moderate	Wheat, Sugarcane
Pilibhit	10	3.6	Low	Wheat, Vegetables
Total	280	100.0	—	—

Table 2. Crops Most Affected by Stray Cattle

Crop	Growing Season	Type of Damage
Wheat	Rabi	Grazing of young plants and mature spikes
Mustard	Rabi	Consumption of leaves and pods
Sugarcane	Kharif	Feeding on succulent stalks
Potato	Rabi	Digging and destruction of tubers

Vegetables	Annual	Grazing at multiple growth stages
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Table 3. Economic Losses and Farmer Responses

Parameter	Value
Farmers affected by stray cattle (%)	86.7
Average crop loss per farmer per season (₹)	38,417
Farmers practicing night guarding (%)	60
Farmers using temporary fencing (%)	45
Farmers involved in community drives (%)	30
Farmers receiving compensation (%)	0

Table 4. Statistical Analysis of Crop Damage

Statistical Test	Result	Significance
Pearson Correlation (r)	0.656	$p < 0.001$
Multiple Regression (R^2)	0.701	$p < 0.001$
One-way ANOVA (F)	7.19	$p = 0.001$
Effect Size (η^2)	0.063	Moderate
Paired t-test (Male vs Female Cattle)	$t = 2.63$	$p = 0.0091$

Table 5. Effectiveness of Coping Strategies

Coping Strategy	Farmers Using (%)	Perceived Effectiveness
Night-time field guarding	60	Moderate
Temporary fencing	45	Low–Moderate
Community cattle drives	30	Low
Homemade cattle shelters	10	Low

5. Discussion

The findings of the present study reveal that stray cattle have emerged as a serious concern in farming and livelihood in the Bareilly Division of Uttar Pradesh. There are a lot of farmers that are suffering from free range cattle ruining crops. In fact, this problem has afflicted 86.7% of farmers in the region (RATHOD & Dixit,2020, p. 8). The economic importance of the agriculture items that can be damaged is shown by the fact that cattle enter into this area and damage crops including wheat, mustard, sugarcane, potatoes and vegetables.

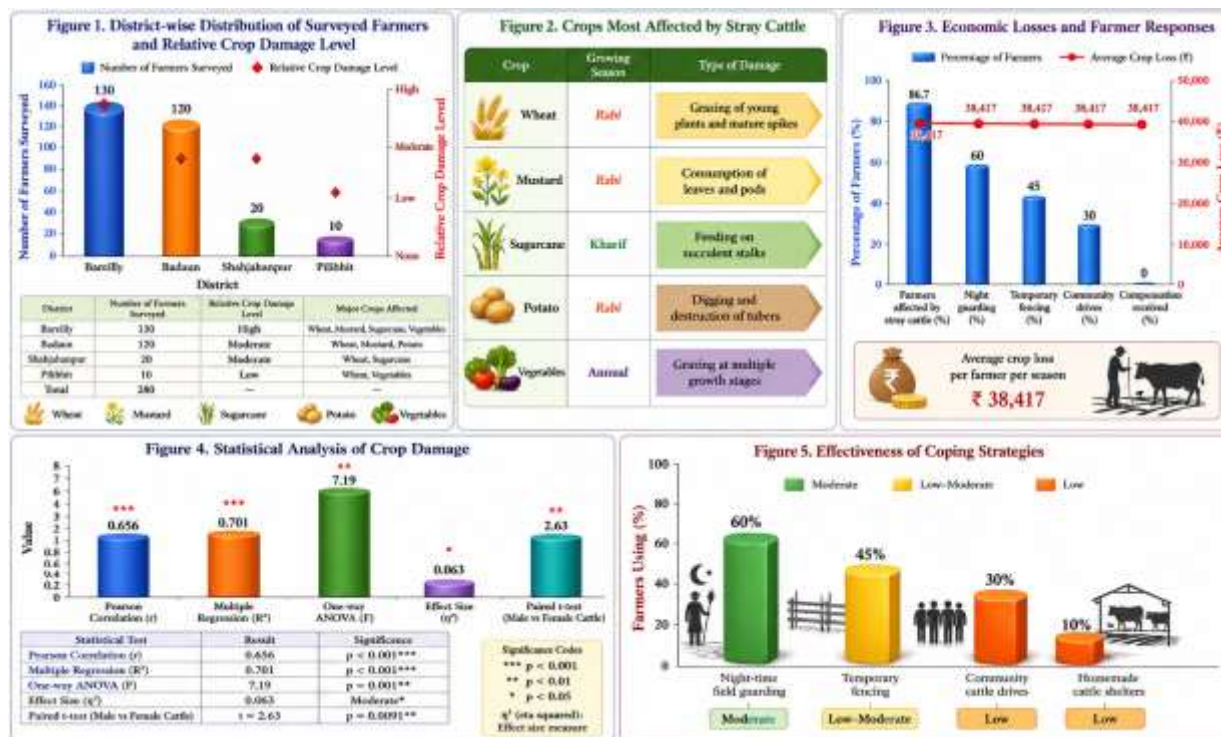


Fig:1 a, b, c & d (District-wise Distribution, Economic Losses, Statistical Analysis, Effectiveness of Coping Strategies)

Already stray cattle are a major cause of agricultural danger in northern India, which tallies with the huge economic losses farmers are projected to experience, researchers have already observed. Singh and Verma (2020) reported similar findings and indicated that there was a huge loss in food productivity and farm income due to cattle grazing in agricultural fields (RATHOD & Dixit, 2020, p. 8). The study findings indicated an average loss during the season, meaning that stray cattle not only interfere with the profitability of farming but also jeopardize the livelihood of the small and marginal farmers that are highly dependent on crop production (Jakobsen & Nielsen, 2024, p. 67).

Other support for the conclusions comes from statistical studies of the effect of the number of animals on crop damage. The strong positive association between the number of cows and crop loss suggests that additional cattle directly increase the vulnerability of agriculture (Snyder et al., 202[^]). For the same reason the regression model indicated that the area of farmland and the number of animals explained a large percentage of the variation in crop damage. The results suggest that animals are more likely to enter larger fields of agriculture that are not adequately fenced (Snyder et al., 202[^]).

ANOVA also indicated substantial differences between herd size groups which supports the hypothesis that the level of crop damage relies on the number of animals in an area. There may be more male cattle than female cattle because humans tend to cull animals that are not producing anything or are not economically productive. This means that for open grazing there are more male cattle. The observation has major consequences for livestock management and policy changes (Tschopp et al., 2021, p. 698765).

The investigation detected major social and psychological as well as economic implications. Night field guarding, constant watching for livestock getting in, not enough sleep, being physically fatigued and fear for farmers. Previous studies have demonstrated that losses of livestock in agriculture can seriously impair the well-being and quality of life of rural households (Pfeifer et al., 2022, p. 20210119). These results support this.

The respondents were also not satisfied with the management measures like cow shelters, animal welfare programs etc. which were already being used by the government. Overcrowded shelters, a shortage of money and a lack of ways to collect compensation appear to be the obstacles to the current activity. Therefore, to minimize crop losses and facilitate long-term agricultural expansion in the region, there is a need to improve the shelters, systems for identifying animals, community engagement, and farmer compensation programs (Galley & Anthony, 2024, p. 598).

6. Conclusion

The present study suggests that stray cattle have become a major socio-economic burden of the farming community in the Bareilly Division of Uttar Pradesh. The data show that a large majority of farmers face recurring crop loss due to stray cattle grazing and trampling, resulting in a considerable decline in agricultural output and farm income. The generality of the problem in varied agricultural systems was shown by the fact that wheat, mustard, sugarcane, potato and vegetable crops were found to be most sensitive.

Statistical testing revealed a strong and significant connection between the number of cattle and damage to crops. The positive correlation of livestock population and agricultural loss and excellent explanatory power of the regression model show that the pressure of stray cattle is a key factor of the destruction of crops in the study area. Results also show that larger agricultural estates are more vulnerable to animal encroachment, which raises the economic burden on farmers.

Besides economic losses, the study also highlights important social impacts, including higher labor demands, sleep deprivation, physical fatigue, and psychological stress related to nighttime crop protection efforts. All these repercussions together impact on the general well-being and livelihood security of the rural households.

The findings suggest that current management practices and government actions have not been effective enough in addressing the growing threat from stray cattle. Hence a holistic approach is urgently needed, including installation of cow shelters, usage of animal identification and tracking technologies, schemes for recompense of farmers, community-based livestock management and stronger enforcement of cattle abandonment regulations.

The study concludes that careful management of stray cattle is required for increasing agricultural production, maintaining the livelihood of farmers and promoting sustainable rural development in Uttar Pradesh. This study will provide the relevant information to the policy makers to come up with effective and long-term strategies to lessen the agricultural losses caused by cattle.

7. Future Scope of the Study

The present study provides important insights into socio-economic impact of stray cattle on agricultural output in Bareilly Division of Uttar Pradesh. However, there are areas where greater research is needed to improve understanding and the ability to develop evidence-based policies.

Future research should widen the geographical scope to cover a greater number of districts and states affected by the stray cattle problem so that comparative assessments may be done under different agro-climatic and socio-economic situations. Longitudinal studies over several crop seasons would be better suited to deal with temporal fluctuations in crop damage and animal movement patterns. Advanced spatial technologies such as Geographic Information Systems (GIS), remote sensing and GPS-based cattle monitoring can be used to monitor the movement of cattle and identify high-risk agricultural zones. Such approaches may enable the creation of early warning systems and tailored management responses.

Further research should also study the effectiveness of other crop protection measures including solar fencing, bio-fencing, community-controlled grazing systems and advanced animal containment strategies. Comparative cost-benefit evaluations of these initiatives would help in identifying economically feasible options for farmers.

Further research could also investigate the larger social, psychological and gender features of the stray cattle problem, notably its implications for home labour division, farmer well-being and the social fabric of rural areas. It would also be crucial to evaluate government schemes, methods of cattle shelter management and procedures of policy implementation to get insights for improvement of existing programs. Further research via economic modelling studies on the long-term impacts of stray cattle on agricultural production, rural incomes and food security could further add value to sustainable livestock and agricultural management. Combining ecological, economic and social views will be necessary for the creation of comprehensive programs that reconcile animal welfare with the aims of agricultural sustainability and rural development.

Future studies should be policy-oriented and interdisciplinary in nature to develop practical strategies to mitigate the negative impacts of stray cattle on farming communities and to build resilient agricultural systems.

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