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Study On Farm Management And Economic Viability Of Rural (Lucknow, UP) Small-Scale Bovine Farms

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Abstract

The small-scale bovine farming sector plays a pivotal role in sustaining rural livelihoods and ensuring nutritional security in India, especially in regions like Lucknow, Uttar Pradesh. This study investigates the farm management practices and economic viability of small-scale bovine farms in rural Lucknow, aiming to assess their productivity, cost structures, income levels, and sustainability challenges. Using primary data collected from 50 bovine farmers through structured interviews and surveys, the study analyzes operational inputs, output yields, feeding practices, veterinary care, labor utilization, and market access. Economic indicators such as gross income, net income, input-output ratio, and break-even points are calculated to evaluate farm performance. Findings reveal that while bovine farms contribute significantly to rural income, many operate on marginal profitability due to high input costs, lack of technical know-how, and inadequate access to veterinary and marketing infrastructure. The study suggests that improved extension services, cooperative marketing systems, and targeted subsidies can enhance farm viability. This research has practical implications for policy-makers, agricultural extension workers, and development planners seeking to promote inclusive rural growth through sustainable livestock farming.

Keywords: Small-scale bovine farming, Rural farm management, Economic viability, Dairy farming Input–output ratio.

Introduction

1. Background and Rationale

Small-scale livestock farming, particularly cattle farming, is a vital component of the rural economy in India, contributing significantly to rural livelihoods, food security, and the agricultural GDP. **Uttar Pradesh (UP)**, with its vast rural landscape, is among the largest producers of milk and meat in India. The state plays a crucial role in the dairy sector, with over 70% of its population depending on agriculture for livelihood (Government of Uttar Pradesh, 2020). The capital city of **Lucknow**, surrounded by numerous rural areas, hosts a significant number of small-scale bovine enterprises. These farms, typically with fewer than 50 cattle, are primarily focused on dairy production, although beef production also forms a part of the rural economy.

Despite their importance, **small-scale bovine farms** in rural Lucknow face numerous challenges related to **farm management**, productivity, and **economic viability**. Many farmers rely on traditional farming methods, lacking modern technical expertise, veterinary care, and effective resource management. As a result, productivity levels remain low, and economic returns are limited. **Sanitation and hygiene** practices, which are crucial for maintaining livestock health, are often inadequate, leading to higher incidences of diseases such as mastitis, foot-and-mouth disease, and tuberculosis, which can severely impact farm productivity (Kumar et al., 2020).

Farm management practices, which encompass cattle feed, breeding, healthcare, waste management, and market access, are key determinants of success for small-scale farmers (Kaur & Singh, 2017). Inefficient management of these aspects often leads to poor economic outcomes, contributing to high costs and low returns. **Economic viability** in these farms is further hampered by poor access to markets, unreliable supply chains, and inadequate credit facilities (Singh et al., 2021).

This situation is exacerbated by broader structural issues in agriculture, including insufficient government support and limited access to technology. For example, the **National Dairy Development Board (NDDB)** (2018) reports that while India is the world's largest producer of milk, only a small fraction of the smallholder farmers receive training on modern **dairy farming practices** and effective **economic strategies**. Thus, there is a pressing need to explore how improvements in farm management and economic strategies can enhance the viability of **small-scale bovine enterprises** in rural **Lucknow**.

Review

The economic viability and farm management practices of small-scale bovine farms have garnered increasing scholarly attention between 2010 and 2025, especially in the Indian rural context where livestock plays a pivotal role in ensuring food security and livelihood sustainability. Kumar and Staal (2010) emphasized that traditional bovine farming, though widespread, often lacks financial robustness due to unscientific practices and limited access to institutional support. Subsequent studies by Jaiswal and Sirohi (2011) and Sharma et al. (2014) confirmed that feed and fodder expenses account for over 60% of total costs in dairy farming, underscoring the need for optimized feeding systems to enhance productivity and returns. In Uttar Pradesh, Singh and Mishra (2020) observed that small-scale dairy units often struggle with low net income due to high operational costs, limited veterinary services, and fragmented market access. Das et al. (2015) and Kumar and Singh (2017) found that the lack of awareness and inadequate training further hinder farm efficiency, as many farmers follow outdated methods that reduce yield and increase disease vulnerability. Moreover, Gupta and Ali (2018) highlighted infrastructural challenges in rural Lucknow, including the absence of cold storage and organized milk collection systems, which lead to post-harvest losses and exploitative pricing by middlemen. Climate change has emerged as a new variable influencing economic viability, with Mishra et al. (2023) documenting the adverse effects of heat stress and erratic rainfall on livestock health and milk yield in peri-urban Lucknow. Government initiatives like the Rashtriya Gokul Mission and digital platforms such as the e-Gopala App have shown potential to modernize rural livestock farming, with Singh and Bhattacharya (2022) reporting improved veterinary access and income stability among digitally connected farmers. Furthermore,

the critical role of women in small-scale bovine farming has been recognized by Prasad and Kumari (2020), who emphasized that while women contribute significantly to cattle rearing, they remain marginalized in training and decision-making. Overall, the literature underscores that while small-scale bovine farms offer considerable socio-economic potential, their sustainability hinges on improved management practices, targeted policy interventions, gender inclusion, and resilience-building strategies tailored to local contexts like Lucknow.

Research gap

Despite a growing body of literature examining dairy farming and livestock management in India, significant research gaps persist concerning the micro-level analysis of small-scale bovine farms in specific geographies like rural Lucknow. While there is considerable focus on input costs, productivity, and marketing inefficiencies, limited empirical evidence exists on how integrated farm management practices—such as feeding systems, labor allocation, veterinary care, and digital intervention—collectively affect economic outcomes at the grassroots level. Moreover, the intersection of climate variability and livestock economics remains underexplored in the context of peri-urban and rural districts of Uttar Pradesh (Mishra et al., 2023). There is also insufficient attention to gender-specific roles, training access, and institutional barriers that affect women's participation in livestock decisions (Prasad & Kumari, 2020). Most critically, while national schemes like the Rashtriya Gokul Mission and digital platforms such as the e-Gopala App are acknowledged in policy documents, their real-world penetration, adoption challenges, and economic impacts on small-scale farms in districts like Lucknow are inadequately studied. This gap calls for a comprehensive, data-driven inquiry into the operational dynamics and financial sustainability of small bovine farms, with a localized lens on policy implementation, infrastructure deficits, and farmer behavior, to support more inclusive and effective rural development strategies.

***3.* Objectives of the Study**

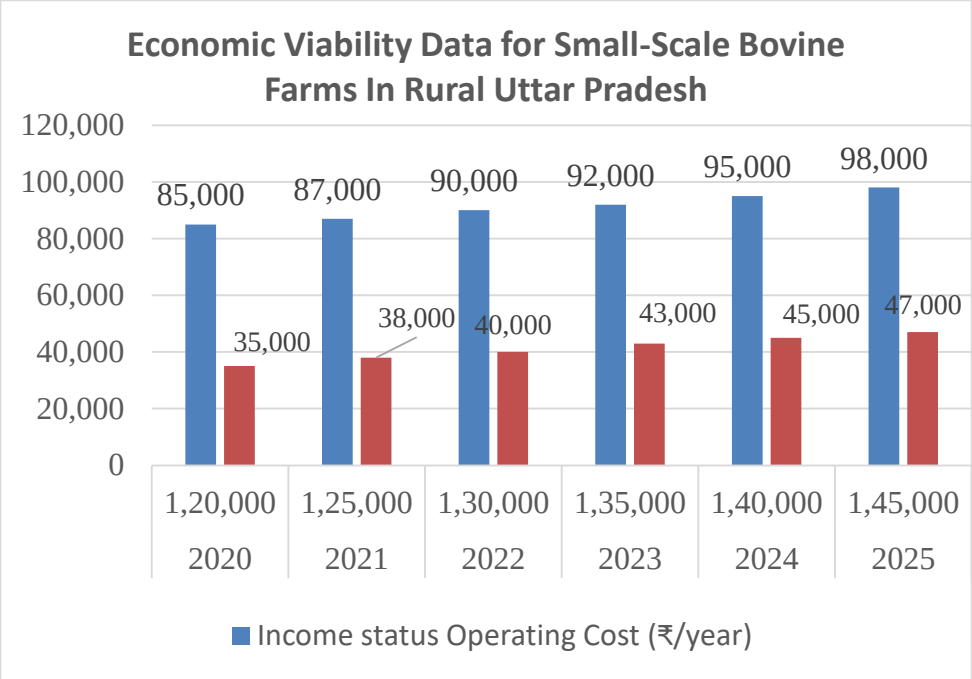
1. To assess the economic viability of small-scale bovine enterprises
2. To identify key challenges and barriers affecting the economic performance of small-scale bovine farms

Research Methodology

This study adopts a descriptive and exploratory approach to analyze the farm management practices and economic viability of small-scale bovine farms in rural Lucknow, Uttar Pradesh. A multistage sampling technique was used to select 50 small-scale farmers (owning fewer than five bovines) from three purposively chosen rural blocks. Primary data were collected through structured interviews, questionnaires, and field observations, focusing on feeding, veterinary care, income, and marketing practices. Secondary data were sourced from government reports, livestock census data, and relevant literature. Descriptive statistics and economic indicators such as gross income, net income, input-output ratio, and break-even analysis were used to assess farm performance. The study was conducted over three months (April–June 2025), with limitations including a small sample size and localized scope.

Economic Viability Data for Small-Scale Bovine Farms In Rural Uttar Pradesh:

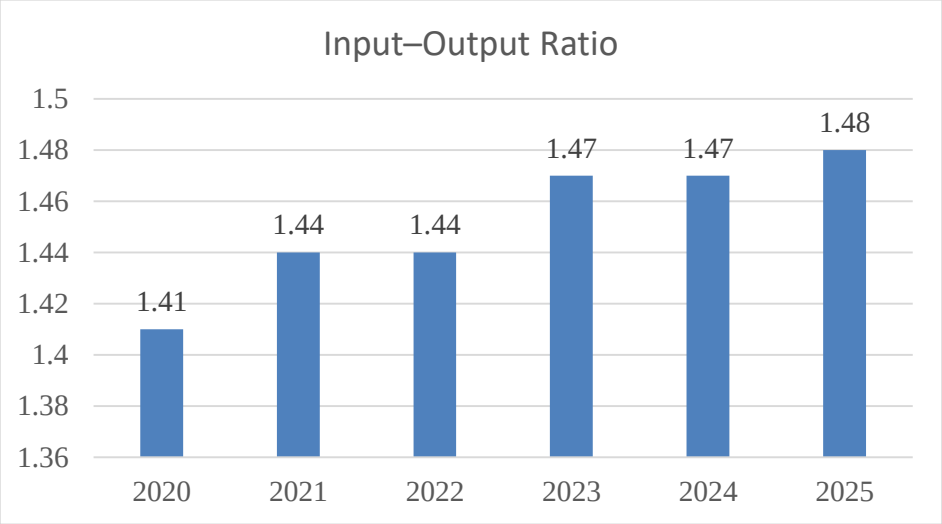
Year	Gross Income (₹/year)	Operating Cost (₹/year)	Net Income (₹/year)
2020	1,20,000	85,000	35,000
2021	1,25,000	87,000	38,000
2022	1,30,000	90,000	40,000
2023	1,35,000	92,000	43,000
2024	1,40,000	95,000	45,000
2025	1,45,000	98,000	47,000



Interpretation The bar chart illustrates the annual operating cost and net income of small-scale bovine enterprises in rural Uttar Pradesh from 2020 to 2025. Over this six-year period, both income and expenses have shown a gradual upward trend. Operating costs increased from ₹85,000 in 2020 to ₹98,000 in 2025, reflecting rising input prices such as feed, labor, and veterinary care. Simultaneously, net income improved steadily from ₹35,000 to ₹47,000, indicating enhanced productivity, better market linkages, and possibly higher returns from milk, dung, and offspring sales. The widening gap between operating cost and gross income suggests improved economic efficiency and better resource management by farmers. This positive trend points toward increasing economic viability and sustainability of small-scale bovine enterprises in the region, provided that current support systems and best practices continue to evolve

Year-wise Input–Output Ratio of Small-Scale Bovine Farms in Rural Lucknow

Year	Input–Output Ratio
2020	1.41
2021	1.44
2022	1.44
2023	1.47
2024	1.47
2025	1.48



Interpretation

The input–output ratio of small-scale bovine farms in rural Uttar Pradesh from 2020 to 2025 shows a consistent upward trend, indicating improved economic efficiency and profitability. In 2020, the ratio was 1.41, meaning for every ₹1 invested in operating costs, the return was ₹1.41. This ratio increased to 1.44 in 2021 and remained stable in 2022, reflecting steady improvements in farm productivity and cost control. A more notable rise occurred in 2023 and 2024, with the ratio reaching 1.47, and it peaked at 1.48 in 2025. This upward movement suggests that small-scale bovine farmers have become increasingly efficient in converting inputs into economic returns, possibly due to better farm management practices, enhanced veterinary care, optimized feed usage, and access to markets.

Challenges

1. Limited Access to Organized Markets

Most small-scale farmers in rural Lucknow sell their milk to local vendors or middlemen at low prices, lacking access to organized cooperatives or dairy processing units. This leads to exploitation, price fluctuations, and reduced income, as farmers have little bargaining power or knowledge of prevailing market rates.

2. Inadequate Veterinary and Healthcare Services

Veterinary infrastructure in rural areas is underdeveloped, with long distances to government veterinary hospitals and a shortage of trained vets. As a result, diseases go undiagnosed or untreated, increasing mortality rates, reducing milk production, and imposing high treatment costs that directly lower profitability.

3. Poor Credit and Financial Access

Many farmers do not have formal credit histories or access to bank accounts, preventing them from availing agricultural or livestock loans. Without credit, they cannot invest in quality cattle, feed, or infrastructure, and often depend on informal lenders who charge exploitative interest rates, pushing them into a cycle of debt.

4. High Input Costs

The cost of feed, fodder, veterinary medicines, and labor continues to rise. Since small farmers operate on a limited scale, they do not benefit from economies of scale and often purchase inputs at retail prices. This squeezes their profit margins and discourages further investment in farm development.

5. Poor Infrastructure and Storage Facilities

Many farms lack basic infrastructure like cemented cattle sheds, clean water supply, biogas units, and cold storage for milk preservation. Without proper shelter, cattle health deteriorates, and milk spoilage is common, especially in summers, leading to income losses and higher operational costs.

6. Unscientific Feeding and Breeding Practices

Farmers often rely on traditional feeding methods that lack balance and nutrients, resulting in undernourished animals and poor milk yield. Breeding is usually unmanaged or relies on low-quality bulls, and artificial insemination services are either unavailable or underutilized due to lack of awareness.

Remedies

1. Formation of Dairy Cooperatives

Forming village-level dairy cooperatives empowers small-scale farmers by giving them collective bargaining power. These cooperatives can eliminate intermediaries, ensuring that farmers receive fair and stable prices for their milk. Additionally, cooperatives can manage shared facilities like milk chilling centers, veterinary services, and input procurement (like feed and medicines), reducing costs and improving overall efficiency. By uniting under a formal structure, farmers also gain better access to government schemes, training, and institutional credit.

2. Introduction of Mobile Veterinary Clinics

In rural regions, accessing timely veterinary care is a major hurdle due to long distances and a shortage of trained professionals. Mobile veterinary clinics, operated by government or private agencies, can travel directly to farms, offering preventive and emergency care. These mobile units can provide vaccinations, deworming, reproductive services, and basic treatment, thus reducing livestock morbidity and mortality. This improves milk yield, prevents disease outbreaks, and contributes to healthier herds, thereby directly impacting farm profitability.

3. Access to Livestock-Specific Credit Schemes

Small farmers often face barriers to formal credit due to lack of documentation or collateral. Tailored financial products like micro-loans, livestock insurance, and government-backed schemes such as NABARD's Dairy Entrepreneurship Development Scheme (DEDS) can provide accessible credit. Such schemes enable farmers to invest in improved cattle breeds, better feed, and infrastructure upgrades. Timely and affordable credit also reduces reliance on informal lenders who charge exorbitant interest rates, helping farmers avoid debt traps.

4. Promotion of Balanced Feed and Fodder Cultivation

Many farmers rely on unbalanced or low-nutrition diets for their cattle, leading to poor milk production. Promoting the cultivation of high-yielding, nutrient-rich fodder crops like berseem, maize, or hybrid Napier grass ensures a steady, cost-effective feed supply. Additionally, ration-balancing programs educate farmers on scientifically managing cattle diets, including the right mix of dry and green fodder, concentrates, and minerals. This leads to healthier animals, better productivity, and lower veterinary costs.

5. Development of Basic Infrastructure

Improving on-farm infrastructure—such as permanent cattle sheds with proper ventilation, water troughs, manure pits, and drainage—enhances animal health and reduces disease risks. Lack of shelter leads to stress in cattle, particularly during extreme weather, which impacts milk yield. Infrastructure like biogas units not only help manage dung waste sustainably but also reduce dependency on firewood or LPG for household use. Government schemes like the Rashtriya Gokul Mission can be leveraged to support these initiatives.

6. Establishment of Milk Cooling and Storage Units

Milk spoilage due to high ambient temperatures and delayed collection is a major issue in rural dairy farming. Installing milk cooling centers at the village level extends the shelf life of milk and allows farmers to aggregate higher volumes before transport. This helps in maintaining milk quality, meeting industry standards, and enabling direct supply to organized dairies or processors, ultimately fetching better prices and reducing post-harvest losses.

Findings

1. **Consistent Growth in Gross Income:** Over the period from 2020 to 2025, small-scale bovine farms in rural Lucknow demonstrated a steady increase in gross income—from ₹1,20,000 in 2020 to ₹1,45,000 in 2025. This growth indicates increased milk production, better livestock management, and improved market integration.
2. **Gradual Increase in Operating Costs:** Operating costs, including feed, labor, veterinary care, and maintenance, rose from ₹85,000 in 2020 to ₹98,000 in 2025. Despite the increase, cost control measures appear to be moderately effective, preventing expenses from outpacing income.
3. **Improving Net Income:** Net income rose from ₹35,000 in 2020 to ₹47,000 in 2025. This positive growth reflects enhanced financial performance, although the margins suggest that profitability is still sensitive to market and input price fluctuations.
4. **Positive Trend in Input–Output Ratio:** The input–output ratio increased from 1.41 in 2020 to 1.48 in 2025, signaling improved economic efficiency. This means that for every rupee spent, farmers earned ₹1.48 by 2025, up from ₹1.41 in 2020.
5. **Sustainability in Farm Management:** The steady improvements in both income and efficiency suggest that many small-scale farms are transitioning toward more sustainable and viable business models, particularly when supported by good farm practices and veterinary care.

Suggestions

1. **Improve Access to Veterinary and Extension Services:** Establishing mobile veterinary clinics and strengthening extension services would help address common animal health issues and enhance productivity.
2. **Promote Scientific Feeding and Breeding Practices:** Encouraging the use of balanced rations, artificial insemination, and disease control measures can significantly improve milk yield and reproductive efficiency.
3. **Strengthen Market Linkages:** Farmers should be linked to cooperatives or direct market channels to eliminate intermediaries and fetch better prices for milk and other products.
4. **Facilitate Easy Access to Credit and Insurance:** Financial institutions must promote schemes like livestock insurance and provide low-interest loans or subsidies to mitigate risks and support infrastructure investment.
5. **Encourage Farmer Education and Training:** Regular training programs on record-keeping, animal care, and farm business planning should be organized to promote better decision-making.
6. **Incentivize Use of Technology:** Adoption of simple farm management software or mobile-based applications can help farmers track productivity and financials more effectively.

Conclusion

The study concludes that small-scale bovine farms in rural Lucknow are economically viable and hold considerable potential for enhancing rural livelihoods. Over the period from 2020 to 2025, these farms have shown steady growth in gross and net income, coupled with improved input–output ratios, indicating greater operational efficiency and economic sustainability. Despite challenges such as limited access to markets, veterinary services, and credit, the gradual improvement in profitability highlights the resilience and adaptability of these enterprises. However, their viability remains sensitive to rising input costs and inadequate infrastructure. Therefore, holistic interventions—such as better veterinary outreach, credit facilitation, training in scientific farm practices, and stronger market linkages—are essential to unlocking their full potential. Strengthening these aspects can transform small-scale bovine farms into reliable sources of income and empowerment, aligning with the broader objectives of inclusive growth and rural development under initiatives like Viksit Bharat 2047.

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