PATHWAYS TO PROSPERITY: LEVERAGING TECHNOLOGY AND ENTERPRISE FOR LIVESTOCK-LED DEVELOPMENT

Harnessing the Next Era of Governance and AI Technologies in Line with Global Frameworks for Inclusive, Gender-Responsive, and Poverty-Free Agri-Livestock Transformation in Andhra Pradesh

A report by
DEPARTMENT OF ANIMAL HUSBANDRY, GOVERNMENT OF ANDHRA PRADESH
in collaboration with
GLOBAL FORUM FOR SUSTAINABLE TRANSFORMATION (GFST)
May, 2025

In an era where sustainable growth and rural livelihoods must co-exist, livestock systems offer a powerful yet underleveraged solution. Andhra Pradesh stands at the forefront of this transformation—driven by evidence, scale, and innovation.

This real-time report brings together three powerful narratives. The first, grounded in data from enterprise-level 30,000 livestock farmers, reveals what it truly means to run animal husbandry as a viable rural business. The second, drawn from 100,000 farmer reflections, captures the texture of Andhra Pradesh grassroots livestock economy—its hopes, its gaps, and its future potential. The third charts a bold vision of circularity in livestock—where waste becomes wealth, and technology amplifies traditional wisdom.

This work is more than a dataset or diagnostic. It is a roadmap for how emerging economies can reimagine livestock as a lever for inclusive development, entrepreneurship, and ecological balance.

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Disclaimer

Grazing New Grounds: Mapping Entrepreneurial Spirit and Sustainable Growth in Andhra Pradesh's Livestock Sector is based on data and insights collected through a rapid survey (April 2025) conducted across various categories of livestock farmers in the state. The survey aimed to assess entrepreneurial potential, access to credit and insurance, adoption of modern technologies, market linkages, feed and fodder practices, and the need for institutional support.

This report is intended for informational and policy guidance purposes only. The findings, interpretations, and conclusions expressed herein are based on the responses received from surveyed farmers and do not necessarily reflect the official views or policies of the Government of Andhra Pradesh or any affiliated departments.

While every effort was made to ensure the accuracy and reliability of the data, the authors do not guarantee the completeness or suitability of the information for any particular purpose. Any errors or omissions are unintentional and the responsibility of the authors. Users of this report are encouraged to supplement it with further analysis and contextual understanding before making programmatic or investment decisions.

Conceptualisation: Prof S Vijay Kumar along with GFST team

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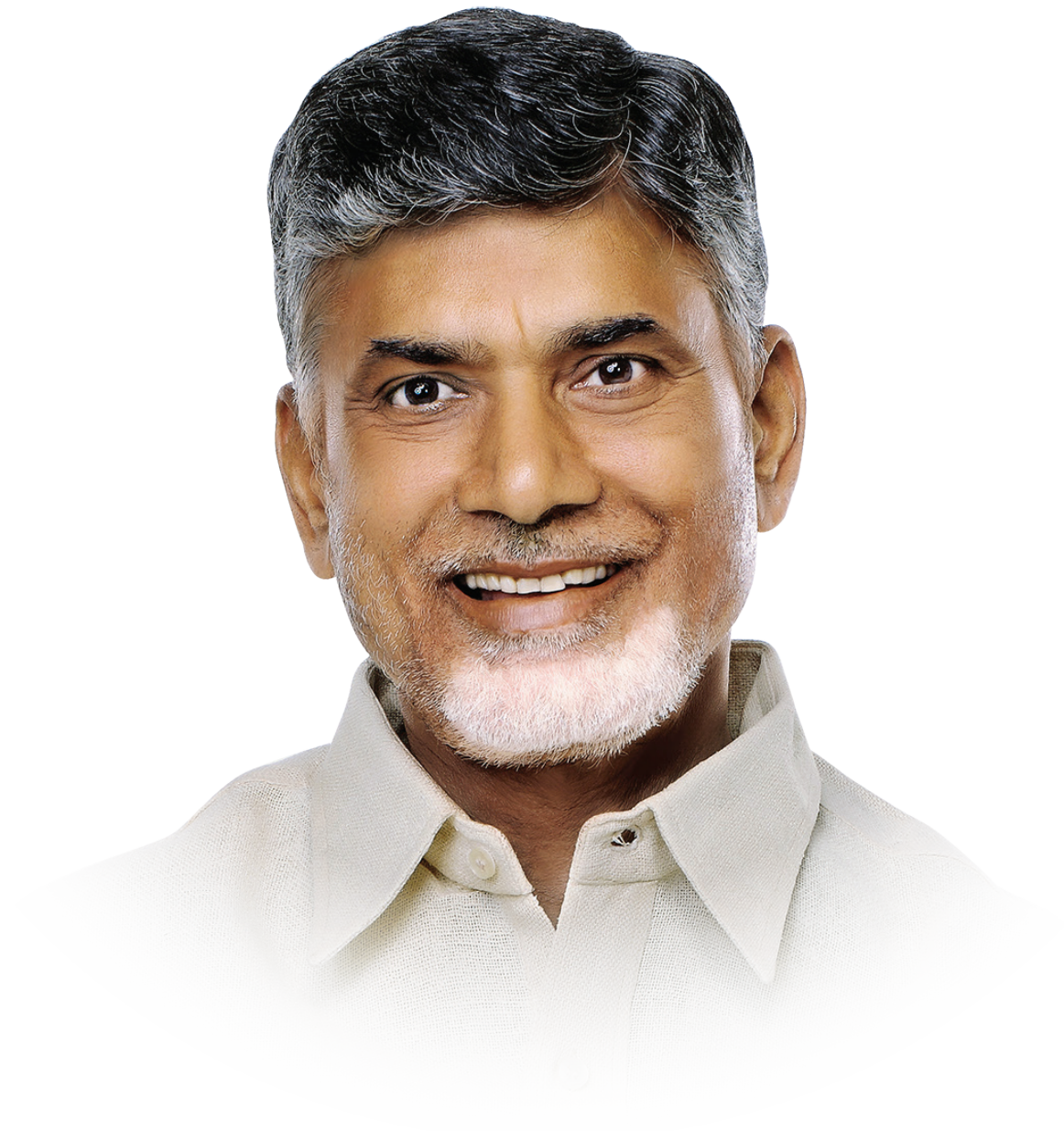
PROLOGUE

This rapid assessment report holds critical significance in the context of Andhra Pradesh's long-term development vision—*Swarna Andhra 2047*—which aspires to elevate the state into a $2.4 trillion economy with a per capita income of $42,000, while simultaneously eradicating poverty through the *Zero Poverty – P4 Policy*. As animal husbandry is a cornerstone of rural livelihoods, especially for small and marginal farmers, its potential to drive inclusive economic growth, generate mass employment, and promote nutritional and financial security is immense. The Chief Minister's call for leveraging the strengths of the Public-Private-People Partnership model further underlines the need to identify and nurture grassroots-level entrepreneurs who can transform livestock rearing into viable, scalable enterprises.

Against this backdrop, the rapid survey served as a strategic exercise to map entrepreneurial readiness, understand systemic gaps, and capture on-ground realities across diverse livestock categories. The insights generated from this report provide a foundation for designing responsive policies, targeted support systems, and innovative interventions that align with the broader vision of zero poverty and sustainable rural transformation. By informing future programs with data-backed evidence, this assessment helps ensure that the growth of the animal husbandry sector contributes directly to economic empowerment and social equity in Andhra Pradesh.



FOREWORD

Livestock farming constitutes a vital component of rural livelihoods in Andhra Pradesh and throughout India. It serves various functions, including ensuring nutritional security, empowering women, generating employment opportunities, and sustaining agrarian communities. As we aspire to achieve a poverty-free Andhra Pradesh by the year 2049, it is essential to unlock the full potential of the livestock sector, which will be integral to our strategy for inclusive growth.

This report offers critical insights derived from enterprise-level and community-based livestock farmers, providing a unique amalgamation of structured data and grassroots realities. It not only details the socioeconomic profiles and challenges encountered by farmers but also elucidates their aspirations for advancement through improved access to credit, veterinary services, feed and fodder systems, and the adoption of advanced technologies.

The findings presented herein are particularly significant as Andhra Pradesh transitions from welfare-centric models to mission-driven governance, which is rooted in innovation, accountability, and citizen engagement. This evidence-based study, conducted by the Global Forum for Sustainable Transformations (GFST), represents a timely contribution to the discourse. It underscores the potential for enhancing circular economies, fostering entrepreneurship, and constructing climate-resilient livestock systems that contribute substantively to the development of our state.

This document is intended to serve as a valuable resource for policymakers, institutions, and partners committed to transforming rural livelihoods through data-driven approaches, dialogue, and strategic design. I commend the efforts of all stakeholders, particularly our farmers, who participated in this initiative.

Let this work mark a significant advancement in our collective journey toward a resilient and equitable Andhra Pradesh.

Nara Chandrababu Naidu
Hon'ble Chief Minister, Government of Andhra Pradesh

MESSAGE

Livestock is more than an economic activity—it is a way of life for millions across India and the Global South. It supports household nutrition, women's empowerment, rural entrepreneurship, and ecological balance. As Andhra Pradesh advances toward its ambitious vision of becoming poverty-free and future-ready by 2049, the livestock sector holds immense untapped potential to serve as a lever for inclusive and sustainable transformation.

This report, *Mapping Entrepreneurial Spirit and Sustainable Growth in Andhra Pradesh's Livestock Sector,* is a timely and strategic contribution to that journey. Conducted at an unprecedented scale, the study brings together insights from over 30,000 enterprise-level livestock farmers and a broader ecosystem of over 100,000 rural households. It explores the critical intersections of economics, credit, insurance, feed, technology, and circular economy practices—grounded in real-time, app-based field data.

What sets this report apart is its alignment with global development frameworks—be it the Sustainable Development Goals (SDGs), the FAO's One Health principles, or the growing global discourse on regenerative agriculture and digital governance. By integrating Artificial Intelligence (AI), smart data systems, and cross-sectoral analytics, this report reflects GFST's mission: to bridge policy and grassroots innovation through forward-thinking, tech-enabled, and people-first solutions.

The findings here are not only a mirror to the realities faced by livestock farmers but also a blueprint for action. They highlight the need to decentralize decision-making, democratize access to technology and finance, and build institutional capacity from the village to the state level.

GFST is proud to partner with the Department of Animal Husbandry, Government of Andhra Pradesh, in this pioneering effort. We hope this work will serve as a springboard for replication across states and regions, inspiring new conversations on entrepreneurship, equity, and sustainability in the livestock sector.

Let this report be a catalyst—not just for policy, but for progress.

S P Tucker, IAS (Retd.)
Vice Chairman & Director, Global Forum for Sustainable Transformation

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PART A

SCALING LIVESTOCK ENTERPRISES: INSIGHTS FROM PROGRESSIVE FARMERS IN ANDHRA PRADESH

This rapid study aims to understand the practices, challenges, and opportunities among progressive livestock farmers in Andhra Pradesh who operate at an enterprise level. By surveying farmers with substantial livestock holdings—across dairy, sheep, goat, piggery, and commercial poultry—the study covered 24,360 livestock farmers and seeks to capture insights into their patterns of credit access, insurance coverage, technology adoption, fodder availability, animal healthcare, and waste management.

CONTEXT

Andhra Pradesh is charting a bold new course in livestock sector transformation, recognizing the pivotal role of entrepreneurial farmers in shaping a sustainable and inclusive rural economy. This report presents the findings of a real-time, app-based survey conducted across the state from May 1st to May 3rd, 2025, covering 24,360 enterprise-level livestock farmers.

The study focused on progressive livestock entrepreneurs owning large-scale herds or units—specifically those with more than 20 milch cows, 20 buffaloes, 200 sheep, 200 goats, 10,000 broilers, and 50,000 layers. The survey was executed by Animal Husbandry Assistants (AHAs) through structured digital forms, ensuring data quality, precision, and field-level validation.

This evidence-based assessment explores economic patterns, investment flows, credit and insurance access, breed management, healthcare practices, and technology adoption among livestock entrepreneurs. By harnessing cross-tabulated analytics, the study reveals systemic gaps, financial needs, market dynamics, and opportunities for technological and circular innovations in the sector.

Anchored in the vision of building a resilient, tech-driven, and globally aligned animal husbandry system, the findings aim to inform policy frameworks, investment strategies, and development programs for the 2025–2030 roadmap of Andhra Pradesh's livestock economy.

COVERAGE

A total of 24,360 enterprise-level livestock farmers were covered in this rapid survey across Andhra Pradesh. Among them, the largest segment—14,550 farmers—were engaged in bovine-based dairying (cows and buffaloes), reflecting the prominence of dairy enterprises in the state's livestock economy. 9,348 farmers owned small ruminants such as sheep and goats, indicating significant representation from traditional pastoral communities and semi-arid regions.

In the commercial poultry sector, 337 farmers reported operating broiler units and 89 farmers managed layer farms, highlighting the presence of large-scale poultry enterprises. Additionally, 36 farmers were engaged in piggery, a relatively small but regionally significant segment, particularly among tribal and marginalized communities.

This distribution reflects both the diversity and scale of livestock enterprises in the state, offering valuable insights for species-specific policy planning and enterprise support.

Rationale of the Study

The livestock sector plays a crucial role in rural livelihoods, food security, and women's empowerment in Andhra Pradesh. As the state moves toward its long-term vision of inclusive, poverty-free development, there is a growing need to understand and support livestock not just as a subsistence activity, but as a dynamic economic enterprise.

While smallholder livestock data is often available, there is limited structured evidence on enterprise-level livestock farmers—those managing high-output dairy units, commercial poultry farms, and large flocks of small ruminants. These progressive farmers are key drivers of rural entrepreneurship, employment, and innovation. Yet, their specific challenges, investment behaviors, and technology needs remain under-researched.

This study aims to fill that gap by capturing real-time, app-based insights from over 24,360 enterprise-level livestock farmers across the state. By focusing on economics, access to credit and insurance, feed and fodder systems, and adoption of modern technologies, the study provides a strategic evidence base to inform Andhra Pradesh's livestock policies, investment models, and innovation ecosystems for the 2025–2030 period.

Understanding this emerging class of livestock entrepreneurs is essential for designing species-specific, scale-appropriate, and future-ready interventions that can accelerate the transformation of the livestock sector from traditional farming to vibrant rural enterprise.

DAIRY FARMERS

AGE CATEGORY

The age distribution of Andhra Pradesh's 14,550 dairy enterprise farmers shows that 7,949 farmers (55%) are aged 45–59, and 4,915 (34%) are in the 30–44 age group—together making up nearly 90% of the total. In contrast, only 529 farmers (3.6%) are between 18–29 years, and 1,157 (8%) are aged 60 and above. This highlights that dairy entrepreneurship is dominated by experienced mid-career individuals, while youth engagement remains limited. The figures point to an urgent need for targeted support for existing operators and youth-focused incentives to ensure generational continuity in the dairy sector.

SOCIAL COMPOSITION

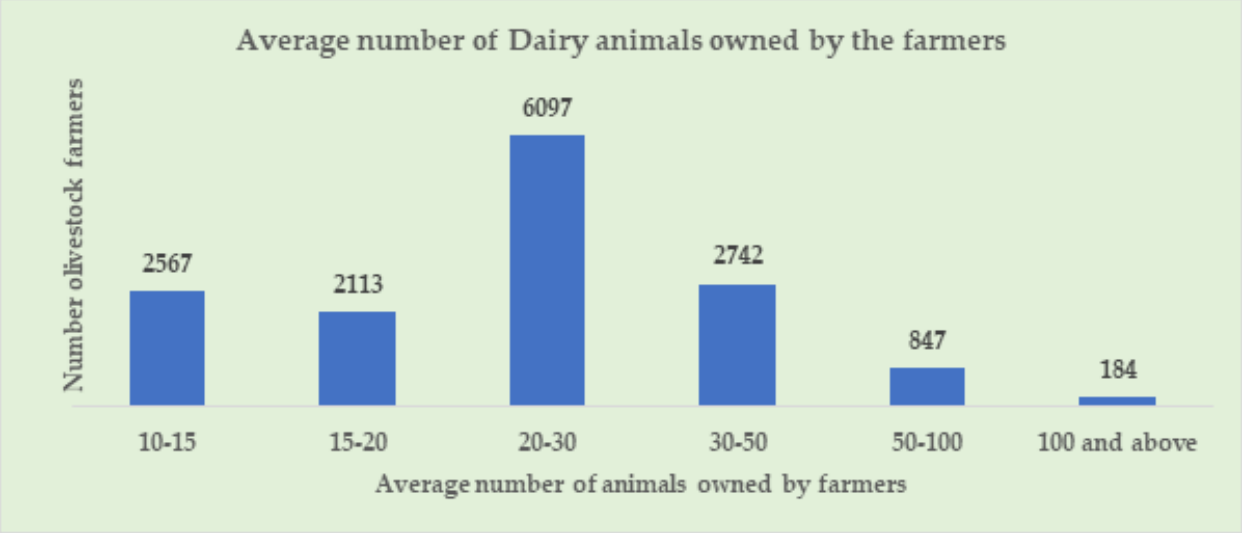
The caste-wise data shows that Backward Classes (43%) and Other Castes (35%) dominate dairy entrepreneurship in Andhra Pradesh. In contrast, Scheduled Castes (12%) and Scheduled Tribes (9%) are underrepresented, pointing to barriers in access to resources and opportunities. This highlights the need for targeted support to promote inclusivity and equity in the livestock sector.

EDUCATION BACKGROUND

The education profile of dairy enterprise farmers shows that a majority have low formal education—5553 (38%) are illiterate and 3608 (25%) have only primary schooling. About 4294 (30%) completed secondary education, while only 1095 (7%) are graduates or above. This indicates a need for simplified training, extension services, and tech adoption models tailored to low-literacy groups to support enterprise growth.

The profile of dairy enterprise farmers in Andhra Pradesh reveals that the sector is led largely by middle-aged individuals, with nearly 90% aged between 30–59 years, and very limited participation from youth. Backward Classes (43%) dominate, while SCs and STs are underrepresented, indicating the need for inclusive policy outreach. Education levels are low, with 63% of farmers either illiterate or with only primary schooling, highlighting the importance of simplified training and accessible technologies. Together, these findings call for targeted support to promote youth participation, social equity, and enterprise development in the dairy sector.

AVERAGE NUMBER OF DAIRY ANIMALS OWNED BY LIVESTOCK FARMERS



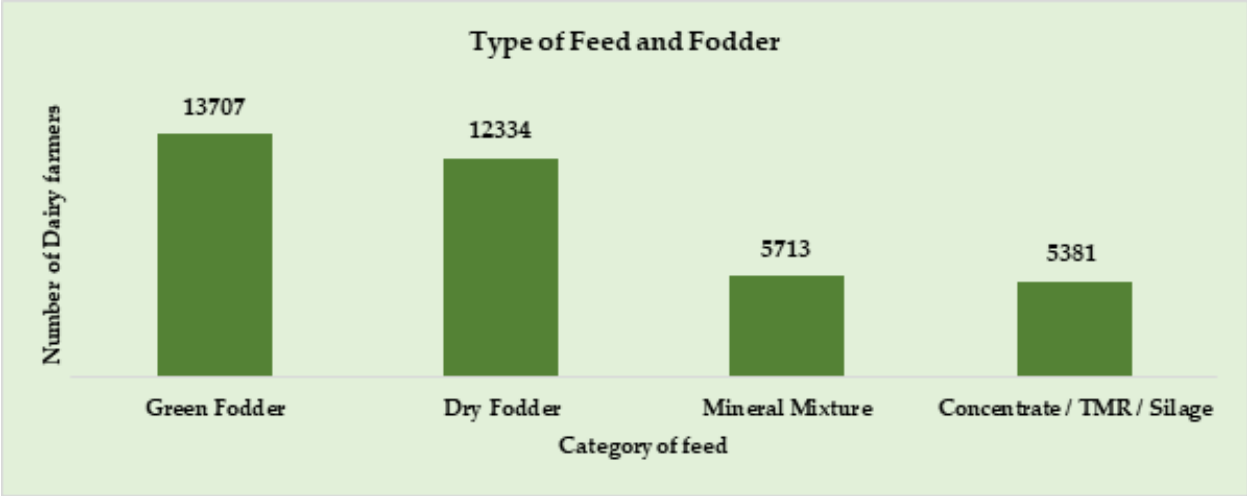
The distribution of dairy farmers by herd size in Andhra Pradesh highlights that mid-scale dairy operations dominate the sector. A majority of 6,097 farmers (42%) own between 20 and 30 dairy animals, making this the most common enterprise size.

This suggests that dairy entrepreneurship in the state is primarily driven by farmers operating at a manageable but commercially viable scale. Additionally, 2,567 farmers own 10–15 animals, 2,113 have 15–20, and 2,742 maintain 30–50 animals, indicating a broad base of potential enterprise-ready farmers who could be further supported through scale-up interventions. In contrast, large-scale operations remain limited, with only 847 farmers owning 50–100 animals and just 184 managing herds of over 100.

This underlines the need for targeted policies that strengthen mid-scale dairy entrepreneurs while also facilitating niche support for larger players to anchor and expand the dairy value chain.

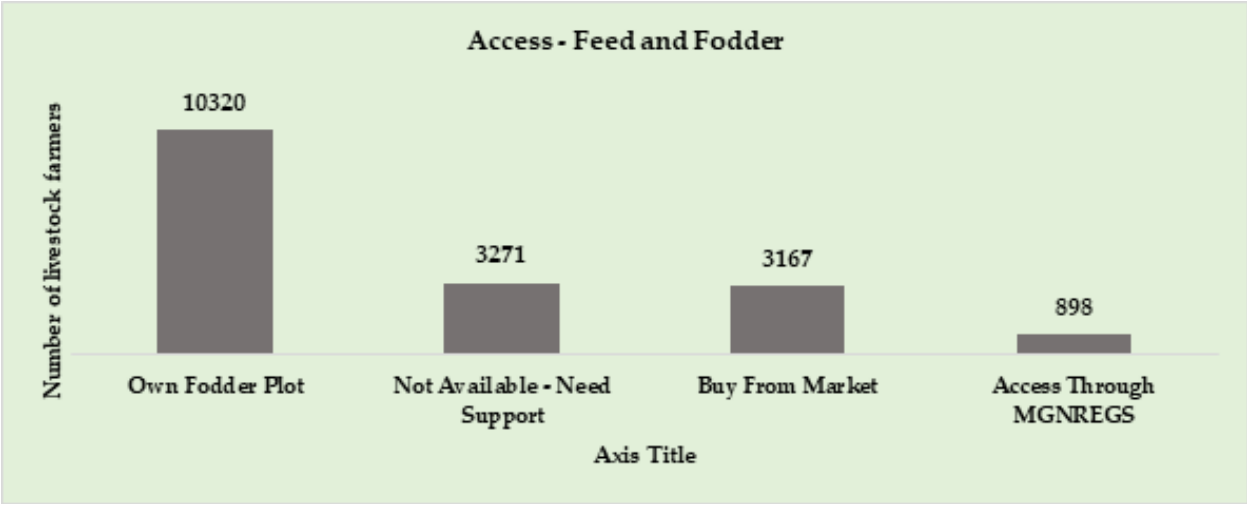
FEED & FODDER

The analysis of feed and fodder usage among dairy farmers in Andhra Pradesh reveals that traditional practices continue to dominate. A large majority of farmers—13,707—rely on green fodder, indicating its critical role in supporting milk production and animal health.



Dry fodder is the second most commonly used, with 12,334 farmers depending on it, likely as a primary resource during lean or dry seasons. However, the adoption of nutritionally enhanced inputs such as mineral mixtures (used by 5,713 farmers) and concentrate feeds like TMR or silage (used by 5,381 farmers) remains limited.

This suggests that while basic feed availability is widespread, scientific feeding practices have yet to scale among most dairy entrepreneurs, pointing to a need for greater awareness, affordability, and access to fortified feed options.

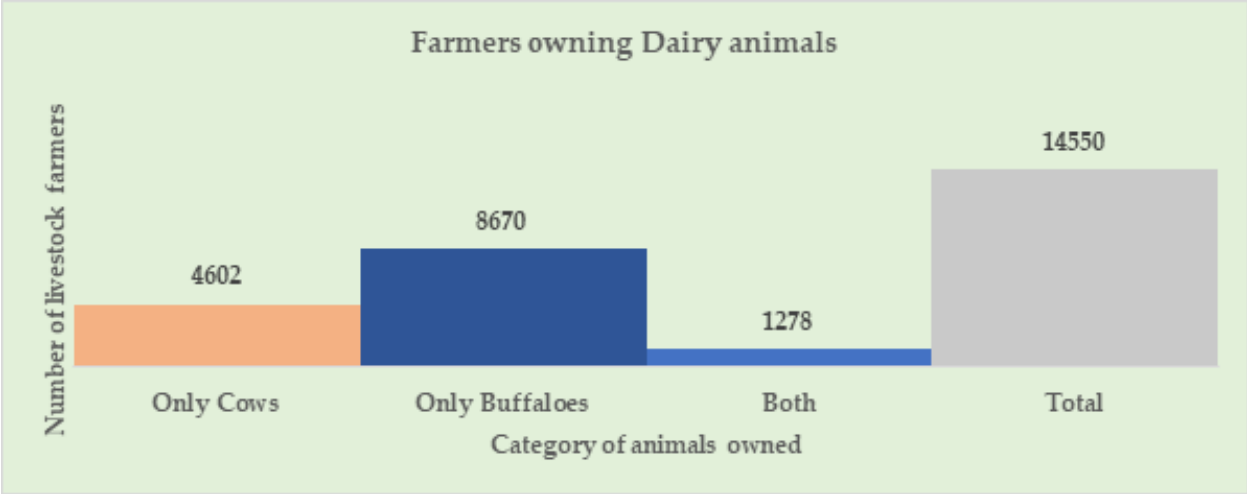


The chart on "Access – Feed and Fodder" reveals that a majority of livestock farmers (10,320) rely on their own fodder plots, indicating strong self-sufficiency among enterprise-level farmers. However, around 3,271 farmers reported that fodder is "not available – need support," and an additional 3,167 are dependent on the market, highlighting vulnerability to price fluctuations and supply constraints.

Strikingly, only 898 farmers access fodder through MGNREGS, suggesting limited awareness or underutilization of this government provision. This points to an opportunity for converging rural employment schemes with livestock support, especially for small and marginal farmers.

Expanding fodder cultivation under MGNREGS could bridge access gaps and enhance climate-resilient fodder systems.

CATEGORY OF DAIRY ANIMALS OWNED BY FARMERS



The chart shows the distribution of 14,550 dairy farmers in Andhra Pradesh by the type of animals they rear. A majority—8,670 farmers (60%)—own only buffaloes, reflecting a strong preference likely due to higher milk fat content and better market prices. 4,602 farmers (32%) rear only cows, while a smaller segment of 1,278 farmers (9%) maintain both cows and buffaloes, indicating more diversified operations.

This suggests that buffaloes play a dominant role in dairy entrepreneurship, particularly in regions where their milk fetches a premium. The relatively low number of mixed-ownership farmers may point to infrastructure, breed preferences, or feed system constraints. These insights are valuable for designing breed-specific support and targeted productivity interventions.

EXPERIENCE IN LIVESTOCK SECTOR

The data reveals that a majority of dairy enterprise farmers in Andhra Pradesh have considerable experience, which is a critical factor in sustaining and scaling livestock-based enterprises. Specifically, 5,589 farmers (38%) have been engaged in livestock farming for 10–20 years, while 2,487 (17%) have over 20 years of experience. These seasoned entrepreneurs likely possess strong operational knowledge, market familiarity, and resilience in navigating risks—traits that contribute to more stable and productive enterprises.

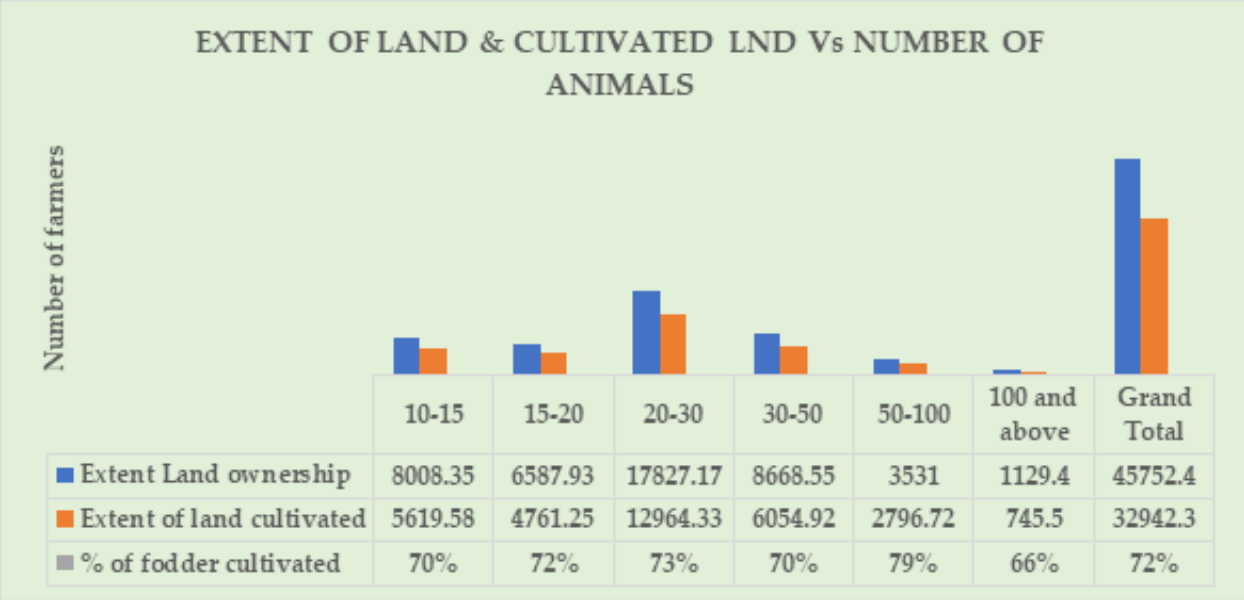
Another 4,614 farmers (32%) fall in the 5–10 year experience bracket, representing a cohort in the growth phase of their entrepreneurial journey. With appropriate support in terms of credit, technology, and value chain integration, this group can be a key driver of rural enterprise expansion.

In contrast, only 1,860 farmers (13%) are in the early stage (below 5 years) of their enterprise journey. This relatively small group may face greater challenges such as limited access to capital, lower confidence in managing operations, and lack of networks. They require tailored handholding, capacity building, and mentorship to move from survival to growth.

Overall, the findings underscore that entrepreneurial experience significantly influences the success and scalability of livestock ventures. Recognizing this, policy frameworks should adopt a tiered approach—leveraging the strengths of experienced farmers while nurturing emerging ones to build a robust and inclusive livestock economy.

LAND OWNED Vs CULTIVATION

The chart titled "Extent of Land & Cultivated Land" offers valuable insights into land ownership, cultivation practices, and fodder production among progressive livestock farmers in Andhra Pradesh.



	10-15	15-20	20-30	30-50	50-100	100 and above	Grand Total
Extent Land ownership	8008.35	6587.93	17827.17	8668.55	3531	1129.4	45752.4
Extent of land cultivated	5619.58	4761.25	12964.33	6054.92	2796.72	745.5	32942.3
% of fodder cultivated	70%	72%	73%	70%	79%	66%	72%

The surveyed farmers own a total of approximately 45,752 acres, of which around 32,942 acres are under cultivation, indicating a high land use efficiency of about 72%. A notable aspect of the data is the prominence of fodder cultivation, which accounts for an average of 72% of the cultivated land. This high percentage is a positive indicator of the farmers' focus on achieving feed self-sufficiency and sustainability in their livestock management.

Breaking down landholding sizes reveals important nuances. Farmers owning between 20 and 30 acres are the most prevalent, owning 17,827 acres and cultivating 12,964 acres, which accounts for 73% of their land. The proportion of cultivated land dedicated to fodder is also high within this group, reflecting a strategic emphasis on feed security. Even among larger farmers owning 50 to 100 acres, 79% of their cultivated land is allocated to fodder, demonstrating a consistent focus on ensuring adequate feed supplies. Smaller holdings, between 10 and 20 acres, similarly dedicate 70–72% of their cultivated land to fodder production, underscoring the importance of self-reliance across different scales of operation.

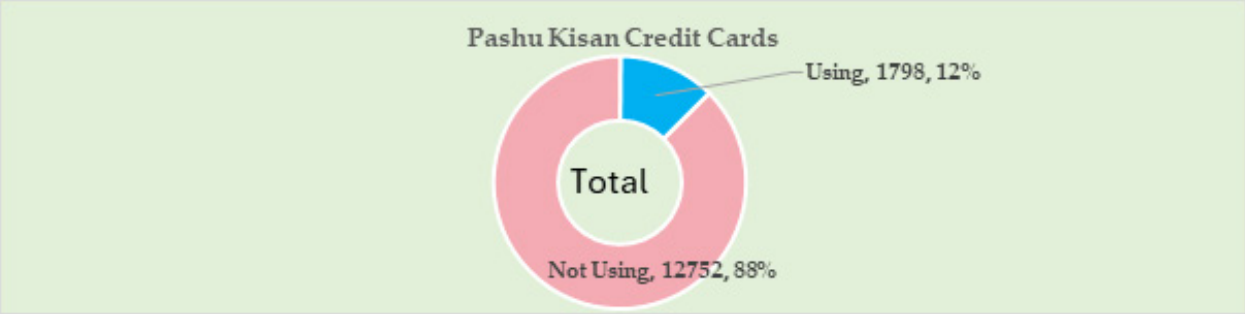
Interestingly, very large landholders with over 100 acres show a slightly lower proportion of 66% devoted to fodder cultivation. This may suggest diversification of land use or underutilization of land specifically for fodder crops in these larger holdings.

Overall, these patterns highlight that high fodder cultivation rates are prevalent across all landholding sizes, indicating a strong awareness and commitment among farmers to foster feed self-reliance. The consistent land utilization efficiency—exceeding 70%—reflects effective land management practices and suggests potential for further intensification of cultivation, especially in expanding fodder production. These practices are vital for scaling livestock enterprises by reducing dependence on external fodder markets, stabilizing input costs, and potentially improving animal health and productivity. The data also reveals that medium-sized farmers, particularly those with 20 to 30 acres, are a key segment, both in terms of land use and fodder production, highlighting the importance of prioritizing them in extension services, mechanization initiatives, and credit support to further strengthen the livestock sector.

The data underscores the critical importance of promoting intensive fodder cultivation across all landholding sizes as a strategic approach to enhance livestock productivity, reduce dependence on external feed sources, and improve economic resilience among farmers.

Policymakers should prioritize supporting medium-sized farms (20–30 acres) through targeted extension services, mechanization, and affordable credit to maximize land use efficiency and reinforce feed self-sufficiency. Additionally, encouraging diversification in large holdings should be balanced with optimizing fodder cultivation to ensure sustainable land use. Strengthening these practices will contribute to a more resilient, sustainable, and scalable livestock sector, ultimately improving livelihoods and food security in Andhra Pradesh.

PASHU KISAN CREDIT CARDS



The data from the Pashu Kisan Credit Card (PKCC) usage reveals a significant gap in financial inclusion among livestock farmers in Andhra Pradesh. Out of 14,550 surveyed farmers, only 1,798 (12%) reported using the PKCC,

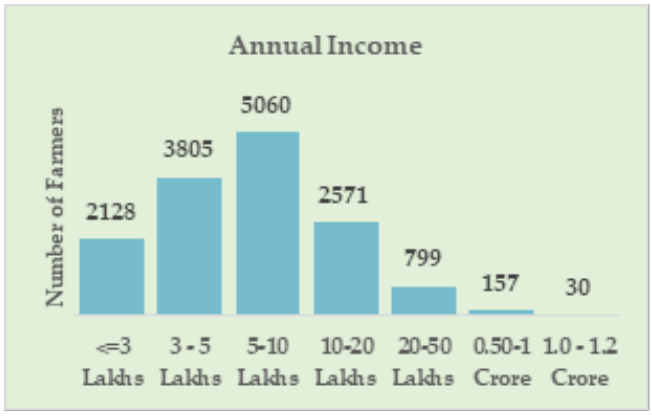
while a staggering 12,752 (88%) are not utilizing this credit facility. This low uptake suggests that the scheme's intended benefits—providing timely and affordable credit for livestock-related expenses—are not reaching the majority. The high percentage of non-users points to issues such as lack of awareness, complex application procedures, or limited facilitation at the grassroots level.

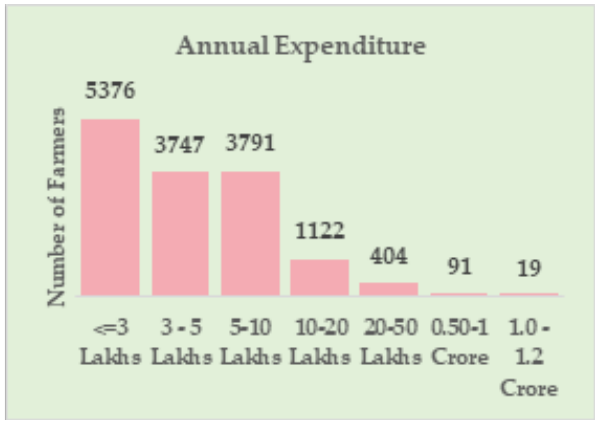
Addressing this gap is essential to improve credit access, enhance productivity, and strengthen the overall resilience of the livestock sector.

ECONOMICS OF DAIRY FARMING FARMERS

The data on economics linked to average animal holding size among dairy farmers in Andhra Pradesh offers critical insights into the relationship between scale, productivity, and profitability in livestock enterprises. A detailed examination reveals that while increasing herd size leads to higher absolute income and expenditure, the economic efficiency—as measured by the income-to-expenditure ratio and milk yield per animal—does not improve linearly and, in fact, declines at higher scales.

ANNUAL INCOME AND EXPENDITURE





The correlation between annual income and expenditure among livestock farmers in Andhra Pradesh reveals key insights into the financial sustainability of different farming segments. At the lower end of the spectrum, a large number of farmers (5,376) report annual expenditures of Rs.3 lakh or less, while only 2,128 farmers fall into the same income category. This mismatch suggests that many smallholders are operating with marginal or even negative returns, pointing to economic vulnerability and the urgent need for productivity enhancement, cost-reduction strategies, and targeted support through subsidies or low-cost inputs.

In contrast, farmers in the Rs.3–10 lakh income bracket—particularly the 5,060 farmers earning Rs.5–10 lakh—show better alignment with expenditure levels. In this group, incomes tend to exceed expenditures (3,791 reporting in the same expense range), indicating financial viability. These mid-tier farmers are well-positioned to benefit from further investments in technology, access to credit, and enterprise development support.

At the higher end, among those earning Rs.10 lakh or more annually, expenditure levels remain proportionate or even lower, signaling efficient financial management and higher profitability margins. For instance, 2,571 farmers

report incomes between Rs.10–20 lakh, while only 1,122 fall into the corresponding expenditure range. This trend continues among even higher earners, demonstrating that as scale increases, so does the ability to manage costs effectively and derive better returns.

Overall, the data reveals a clear pattern: income and expenditure become more favorably aligned as farmers move up the value chain. This underscores the need for a differentiated policy approach—focused on reducing costs and risks for smallholders, improving access to technology and finance for mid-scale farmers, and facilitating market and infrastructure integration for large-scale entrepreneurs.

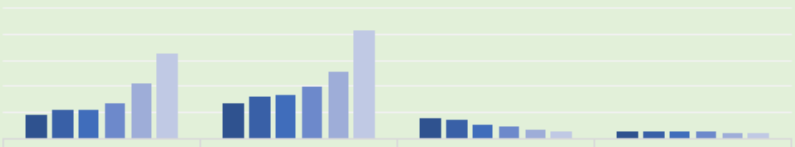
ENTERPRISE-LEVEL LIVESTOCK ECONOMICS: TRENDS IN COST, RETURN, AND EFFICIENCY

Farmers with smaller herds of 10–15 animals demonstrate a reasonable balance, with average annual expenditure of Rs.4.77 lakh and income of Rs.6.84 lakh, resulting in an income-to-expenditure ratio of 1.4. These farmers also report a relatively high average milk yield of 4.15 litres per animal per day. As we move to the 15–20 and 20–30 animal categories, expenditure rises to Rs.5.55 lakh and Rs.5.60 lakh respectively, while income improves to Rs.8.10 lakh and Rs.8.48 lakh. These two groups maintain the highest income-to-expenditure ratio of 1.5, reflecting operational efficiency. However, milk yield drops slightly to 3.72 and 2.81 litres per animal per day, indicating potential dilution of individual animal productivity even within optimal economic ranges.

The 30–50 animal group sees an average expenditure of Rs.6.87 lakh and income of Rs.10.08 lakh, maintaining the favorable 1.5 ratio. However, milk yield drops further to 2.58 litres per day. This group may represent a tipping point where economies of scale are still beneficial but begin to strain animal productivity due to management and resource constraints.

Significantly, larger holdings—50–100 animals and 100+—present a different picture. The 50–100 group spends an average of Rs.10.63 lakh and earns Rs.12.73 lakh (ratio: 1.2), while the 100+ category incurs Rs.16.33 lakh in expenditure and earns Rs.20.83 lakh, with a lower ratio of 1.3. More striking is the continued decline in per-animal milk productivity, which drops to 1.79 litres in the 50–100 bracket and to just 1.56 litres per day in the 100+ group.

Economics with Average Animal Holding Size



	Average Expenditure in Lakh Rs	Average Income in Lakh Rs	Average Milk Yeild in Lts/ Day	Income/Expenditure Ratio
10-15	4.77	6.84	4.15	1.4
15-20	5.55	8.10	3.72	1.5
20-30	5.60	8.48	2.81	1.5
30-50	6.87	10.08	2.58	1.5
50-100	10.63	12.73	1.79	1.2
100 and above	16.33	20.83	1.56	1.3

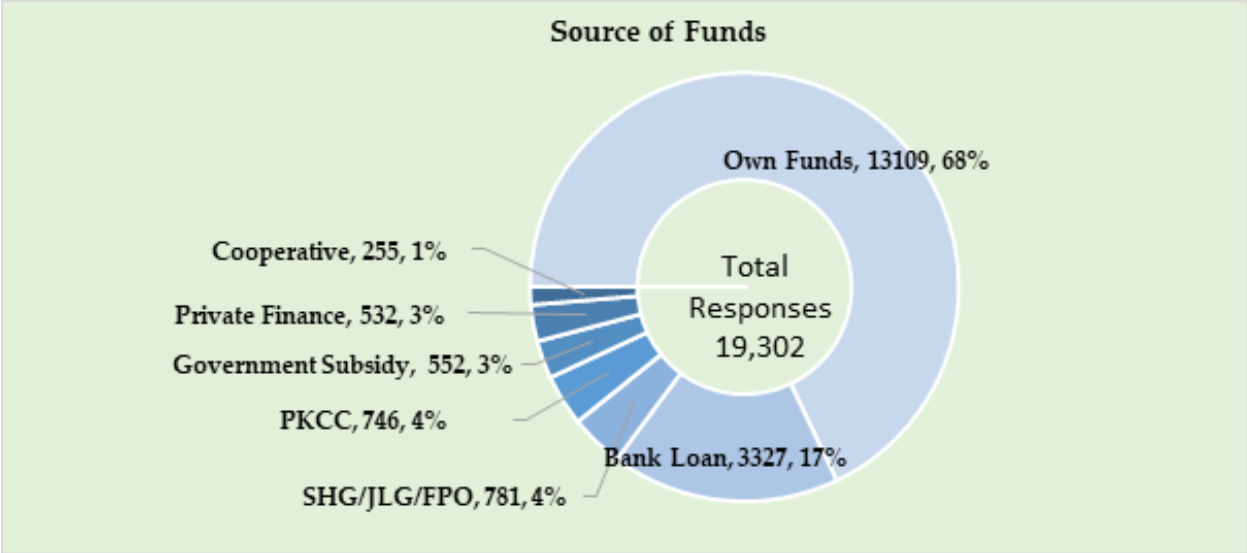
This inverse relationship between herd size and per-animal productivity indicates that while large herd owners benefit from scale in terms of total output, they face challenges in maintaining efficiency. Factors such as higher labor costs, fodder constraints, management complexity, and animal health could contribute to these inefficiencies.

In conclusion, the data suggests that the most economically efficient segment lies in the mid-scale range (15–50 animals), where profitability and productivity strike an optimal balance. Larger enterprises, while generating higher gross incomes, experience diminishing returns in efficiency and milk yield.

Therefore, policy support should focus on strengthening mid-scale enterprises through better veterinary care, feed optimization, and financial tools, while also equipping large-scale operators with technology, training, and infrastructure to enhance per-animal productivity and overall sustainability.

SOURCE OF FUND

The chart on Source of Funds paints a revealing picture of the financial architecture underpinning livestock enterprises in Andhra Pradesh. Out of 19,302 responses, a substantial 68% (13,109 farmers) reported relying on own funds to support their livestock activities. This heavy dependence on self-financing underscores the resilience and commitment of livestock farmers but also points to a serious structural gap in the reach and effectiveness of institutional financial systems.



Only a modest proportion of respondents have accessed bank loans, indicating either barriers to entry—such as cumbersome procedures, lack of collateral, or limited banking infrastructure—or low financial literacy regarding loan products. Just 4% (746 farmers) are using the Pashu Kisan Credit Card (PKCC), a flagship initiative aimed at providing timely and affordable working capital to livestock farmers. This low penetration suggests that even well-intentioned credit instruments have not been fully operationalized at the grassroots level.

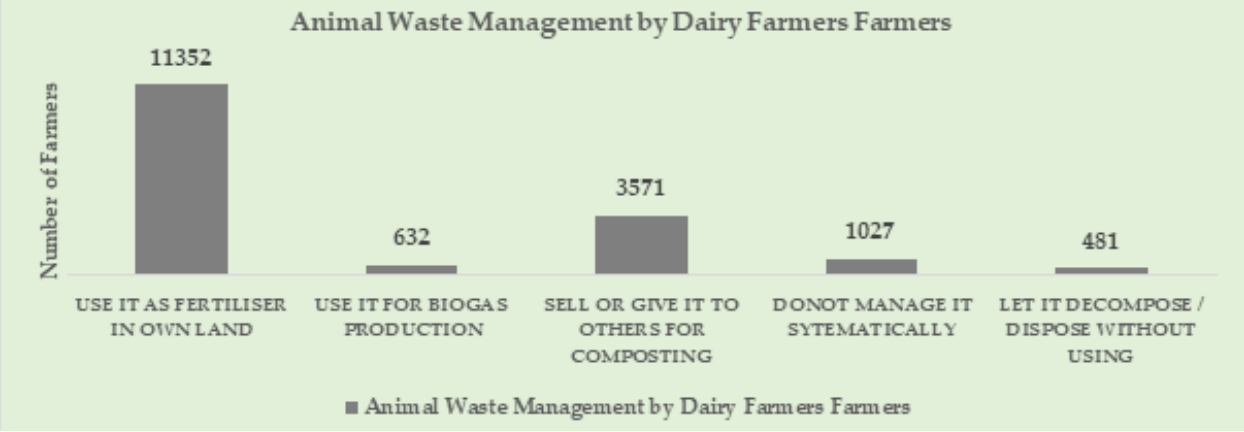
Further, government subsidies and private finance each account for just 3% of responses, and cooperative finance and SHG/JLG/FPO channels are also minimally tapped. This suggests significant underutilization of collective platforms that could otherwise serve as effective intermediaries for credit disbursement and repayment.

The implications are twofold: first, small and medium livestock farmers remain vulnerable to financial shocks due to a lack of institutional safety nets; and second, the growth potential of the livestock sector is constrained by limited capital infusion. With over two-thirds of farmers relying on their savings, expansion, modernization, and adoption of innovations remain difficult.

A robust policy response should aim to (1) scale up the outreach of PKCC through SHGs and cooperatives, (2) reduce the procedural bottlenecks in credit access, (3) promote blended finance models that combine public support with private lending, and (4) embed credit literacy into extension and training programs. This integrated approach will help shift livestock financing from self-reliant survival to credit-enabled entrepreneurship—critical for accelerating inclusive and sustainable rural development.

ANIMAL WASTE MANAGEMENT

Efficient animal waste management is critical not only for environmental sustainability but also for enhancing farm-level productivity, improving sanitation, and unlocking rural bioeconomy opportunities. A detailed analysis of responses from 16,063 livestock farmers in Andhra Pradesh reveals varied approaches to managing animal waste, with important implications for future policy design.



A large majority of farmers (11,352; approximately 70%) reported using animal waste directly as organic fertilizer on their own land. This reflects the persistence of traditional, integrated crop-livestock farming systems where nutrient recycling is naturally embedded. These farmers effectively utilize dung and organic residue to enhance soil fertility, reduce dependence on chemical fertilizers, and maintain ecological balance. This widespread practice offers a strong foundation for scaling up organic and natural farming models under state-supported missions.

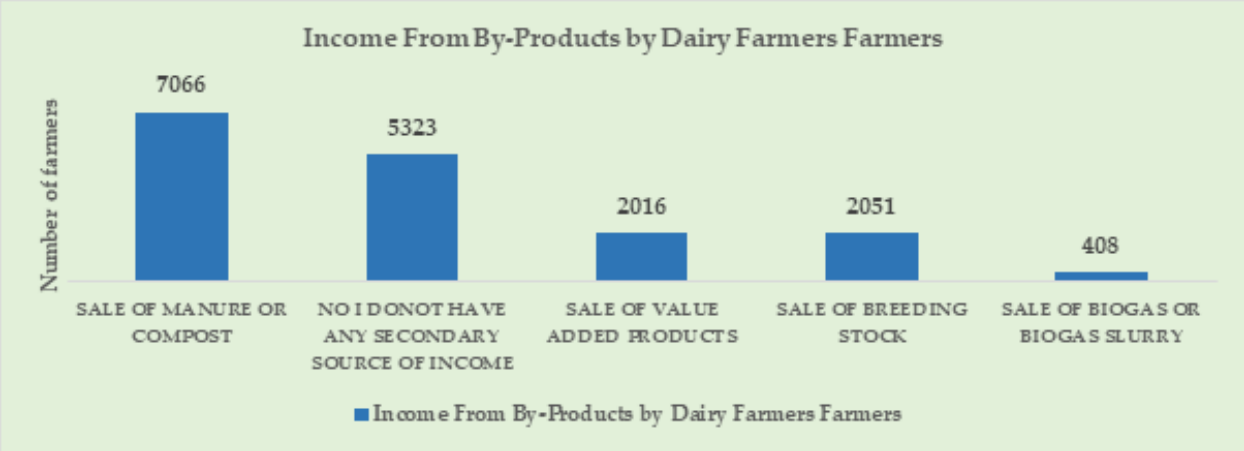
Another 22% of farmers (3,571) reported either selling or giving away animal waste to others for composting purposes. This highlights the existence of informal manure markets and community-led composting networks, particularly in areas where farmers may not have enough land for on-farm use. With appropriate incentives and infrastructure, this group could be mobilized into organized compost cooperatives or SHG-led enterprises focused on producing and marketing organic manure, thereby converting waste into a steady income stream.

In contrast, a very small fraction (632 farmers; just 4%) currently utilize animal waste for biogas production. Despite its significant potential to generate clean cooking fuel, reduce indoor air pollution, and offer slurry-based organic manure, the adoption of biogas technology remains limited. Barriers such as upfront costs, lack of awareness, and inadequate technical support may be contributing to this gap. This presents a major policy opportunity: the government can promote household and community biogas units—particularly in areas with high livestock density—by offering capital subsidies, technical training, and linking such initiatives to carbon credits and renewable energy programs.

Alarmingly, over 9% of farmers (1,508 in total) either do not manage animal waste systematically (1,027) or simply let it decompose without using it (481). These practices raise serious environmental and public health concerns, particularly in peri-urban and densely populated rural regions. Poorly managed animal waste can contaminate water sources, breed disease, and contribute to greenhouse gas emissions. Targeted awareness campaigns, demonstration projects, and extension support are needed to ensure that these farmers are brought into the fold of responsible and productive waste management.

INCOME FROM BY-PRODUCTS

Based on the data collected from dairy farmers in Andhra Pradesh, it is evident that a considerable number of farmers are deriving income from various by-products of dairy farming, though significant gaps remain in value realization.



The most common secondary income source is the sale of manure or compost, reported by 7,066 farmers. This reflects strong utilization of organic waste for farm or market use, indicating potential for expansion into organized composting or organic fertilizer enterprises. However, 5,323 farmers—roughly a third of the sample—reported having no secondary source of income from their dairy activities. This suggests a substantial untapped opportunity to enhance household incomes through better integration into dairy value chains.

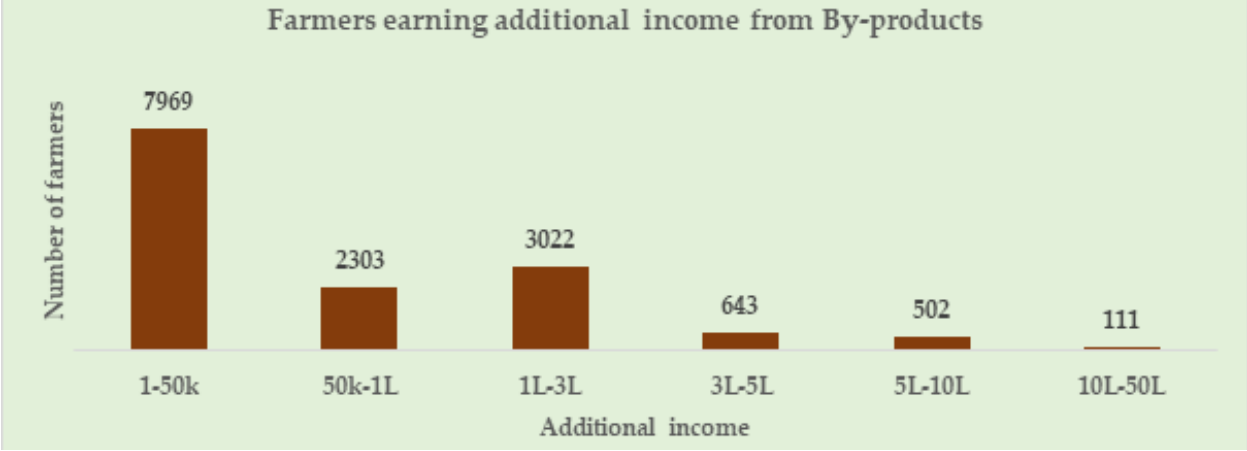
Only 2,016 farmers reported earning from value-added products such as curd, paneer, ghee, or flavored milk, highlighting the low penetration of processing at the farm level. Similarly, the sale of breeding stock is practiced by 2,051 farmers, showing some engagement with animal husbandry enterprises beyond milk production, though this too can be improved through better access to veterinary services and livestock improvement programs. Notably, only 408 farmers reported income from biogas or slurry, indicating minimal adoption of biogas technology. This

reflects a missed opportunity for integrating clean energy solutions with dairy waste management and suggests a need for targeted support in terms of infrastructure, awareness, and subsidies.

Overall, the data reveals a significant scope for enhancing farmer incomes through better use of dairy by-products. Strategic interventions such as promoting value addition, enabling access to renewable energy technology, supporting manure-based enterprises, and expanding breeding services can convert existing gaps into economic opportunities for smallholder dairy farmers.

ADDITIONAL INCOME BY-PRODUCTS

The analysis of additional income earned by dairy farmers from by-products in Andhra Pradesh reveals a broad but uneven distribution of economic benefits.



Out of the 14,550 farmers surveyed, a majority—7,969 farmers—earn up to Rs.50,000 annually from by-products such as manure, compost, value-added dairy products, breeding stock, and biogas. This indicates that for a significant portion of farmers, income from by-products remains modest and supplementary in nature. However, there is a notable segment—approximately 5,325 farmers—earning between Rs.1 lakh and Rs.5 lakh annually, suggesting the emergence of a middle-income group that is more effectively leveraging by-products for enterprise-level activities. These farmers are likely engaged in structured operations involving compost marketing, dairy processing, or livestock trade.

At the higher end of the income spectrum, 502 farmers earn between Rs.5 lakh and Rs.10 lakh annually, and 111 farmers earn between Rs.10 lakh and Rs.50 lakh, indicating the presence of a small but growing group of high-performing dairy entrepreneurs. These outliers demonstrate the transformative potential of dairy by-products when supported by appropriate infrastructure, market access, and entrepreneurial skills. Their success underscores the importance of identifying and replicating scalable models for broader adoption.

The overall pattern points to a pyramid structure: a wide base of low-income earners and a narrow top of high-income performers. This suggests both opportunity and challenge—the potential to uplift thousands of low-earning farmers through targeted interventions, and the need to understand and disseminate the practices of those at the top.

Enhancing by-product utilization across the board will require a tiered approach: providing training, small equipment, and working capital to the majority at the base; offering business development support and credit access to the emerging middle tier; and recognizing and empowering the high performers as role models and anchors for rural enterprise ecosystems.

SAMLL RUMINANT FARMERS

AGE PROFILE

Out of 9,348 small ruminant farmers, the majority—4,449 (48%)—are in the 45–59 year age group, followed by 4,014 (43%) in the 30–44 year range. Only 438 (5%) are youth (18–29 years), and 447 (5%) are aged above 60. This shows that small ruminant farming is dominated by middle-aged farmers, with minimal youth engagement—highlighting a need for youth-targeted programs to ensure generational continuity.

SOCIAL CATEGORY

Backward Classes (BC) make up the largest segment, with 7,814 (84%) farmers, followed by Scheduled Castes (SC) at 585 (6%), Other Castes (OC) at 532 (6%), and Scheduled Tribes (ST) at 341 (4%). Minorities account for just 76 (<1%). This indicates strong BC representation in small ruminant farming, but also highlights underrepresentation of STs and minorities, signaling the need for more inclusive outreach and support.

EDUCATION PROFILE

A striking 5,971 farmers (64%) are either illiterate (4,971) or educated only up to 5th standard (2,481). Only 1,747 (19%) have completed secondary education, and 149 (just 1.6%) are graduates or above. This low literacy level underlines the importance of simplified, visual, and vernacular-based training and extension models tailored to the educational backgrounds of these farmers.

Small ruminant farming is concentrated among middle-aged, socially disadvantaged, and low-literate populations. Strategic interventions must focus on literacy-sensitive capacity building, youth and tribal engagement, and socially inclusive enterprise support to drive sustainable growth in this sector.

EXPERIENCE IN LIVESTOCK SECTOR

The experience profile of dairy enterprise farmers in Andhra Pradesh shows that a significant majority—6,195 farmers (over 73%)—have more than 10 years of experience, with 4,006 (47%) in the 10–20 year range and 2,189 (26%) having over 20 years. This indicates a mature and seasoned base of dairy entrepreneurs who are likely well-versed in farm management, market dynamics, and risk handling.

Meanwhile, 2,599 farmers (31%) have 5–10 years of experience, representing an important growth-stage segment that can benefit from targeted support to scale operations. Only 554 farmers (6%) are relatively new (0–5 years), suggesting limited new entry into the sector.

These insights highlight the need to strengthen support for mid-career and experienced farmers, while also creating enabling conditions—such as access to capital, mentorship, and training—for encouraging new entrants into dairy entrepreneurship.

MARKETING

The market access data for dairy enterprise farmers in Andhra Pradesh shows that a vast majority—8,708 farmers (76%)—sell their products through local markets, while 3,056 (27%) rely on local vendors. This heavy dependence on informal, unorganized channels indicates limited price control, reduced margins, and potential exploitation by intermediaries.

In contrast, only 265 farmers (just 2.3%) sell to private companies, and a mere 62 farmers (0.5%) are linked to cooperatives. Even fewer—just 13 farmers—use online platforms, reflecting very poor integration into formal or digital markets.

These figures highlight a critical need for policies that strengthen institutional market linkages, expand cooperative networks, and promote digital platforms and contract farming models. Enhancing market access and transparency will be essential to improve income stability and scale up rural dairy entrepreneurship.

PASU KISAN CREDIT CARDS

The data reveals that access to formal livestock credit remains extremely limited among farmers in Andhra Pradesh, with only 740 farmers (just 8%) reporting ownership of a Pasu Kisan Credit Card (PKCC), while a staggering 92% (8,608 farmers) do not possess one. This low penetration of a key livestock-specific credit instrument points to systemic challenges such as limited awareness, procedural hurdles, or inadequate institutional outreach.

Given the critical role of timely and affordable credit in sustaining livestock enterprises, there is an urgent need to scale up PKCC access through simplified application processes, targeted awareness campaigns, and stronger coordination between banks, animal husbandry officials, and rural institutions like SHGs and FPOs. Expanding PKCC coverage can help improve cash flow, reduce dependency on informal credit, and strengthen the overall financial resilience of livestock farmers.

SOURCE OF INVESTMENT

The investment pattern among livestock enterprise farmers in Andhra Pradesh shows a heavy dependence on own funds, with 8,881 farmers (over 90%) relying on personal savings to finance their operations. This indicates limited access to affordable and structured financial services and suggests that most farmers are self-financing their businesses, potentially restricting scale, modernization, and risk resilience.

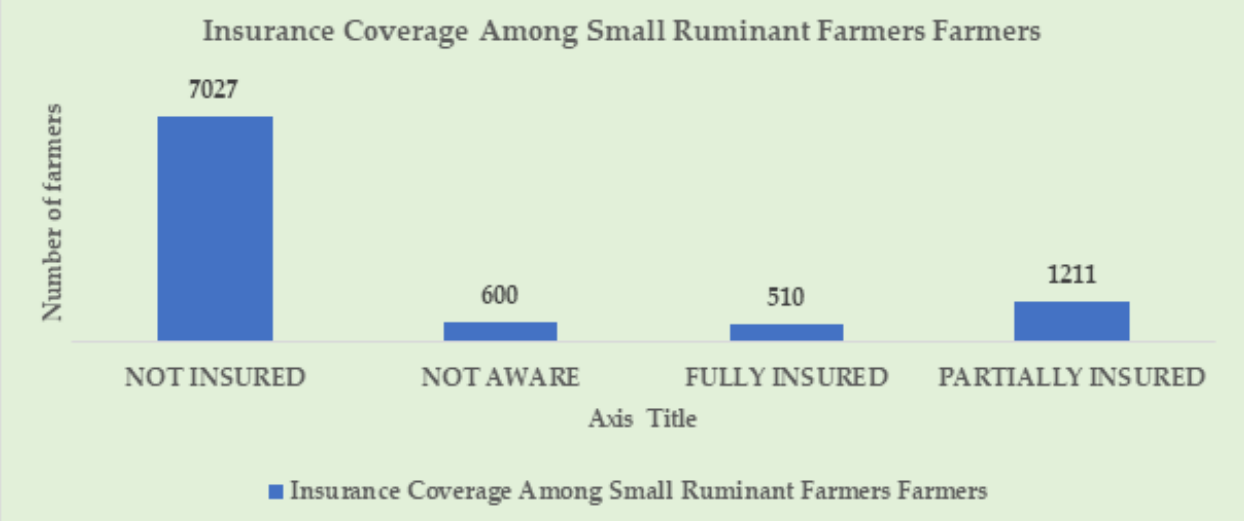
Formal institutional credit plays a much smaller role: only 1,608 farmers (16%) accessed bank loans, while just 312 used the Pasu Kisan Credit Card (PKCC), and 95 relied on cooperatives. This reflects underutilization of available institutional credit avenues, possibly due to procedural complexities, awareness gaps, or eligibility barriers.

Community-based finance models, such as SHG/JLG/FPOs, reached 350 farmers, indicating some traction but still limited compared to their potential, especially for smallholders and women. Government subsidies, accessed by 354 farmers, appear modest, suggesting a need to strengthen the outreach and implementation of public financial support schemes.Meanwhile, 377 farmers are dependent on private finance, which may come with high interest rates and informal terms, increasing financial vulnerability.

In summary, the data highlights a pressing need to improve access to formal and affordable finance, simplify procedures, enhance awareness about credit instruments like PKCC, and scale up support through SHG/FPO-led models and government schemes to ensure inclusive and sustainable growth in the livestock sector.

INSURANCE COVERAGE

The chart titled “Insurance Coverage Among Small Ruminant Farmers” presents data on the insurance status of farmers.



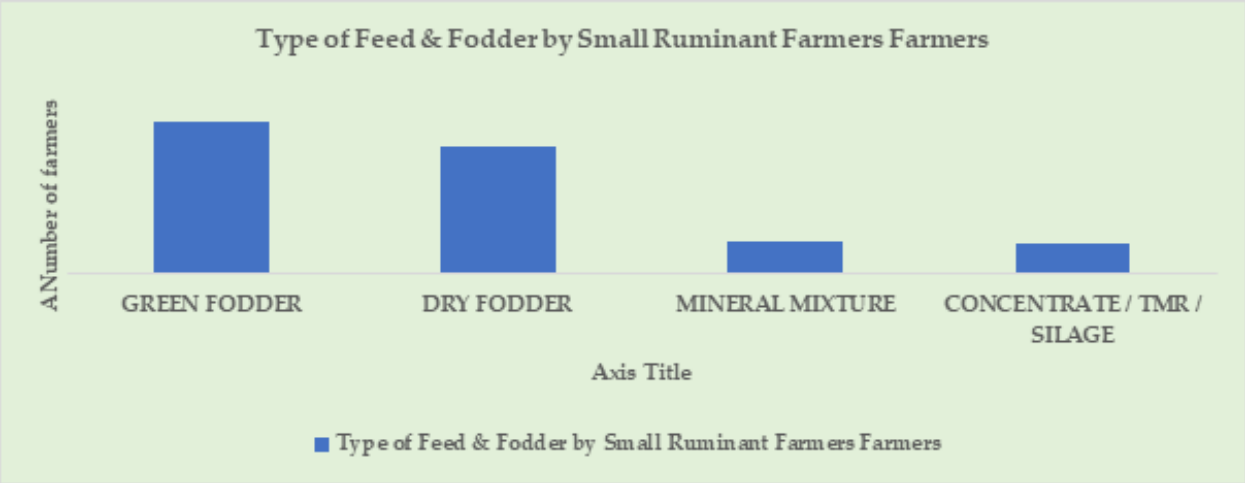
A significant majority of small ruminant farmers (7027 individuals) do not have any form of insurance coverage. This suggests a large gap in risk management and protection for these farmers, potentially leaving them vulnerable to unexpected events like livestock disease or environmental shocks. A smaller group of farmers (600 individuals) are unaware of insurance options available to them. This indicates a need for increased awareness campaigns and education about insurance products, which could be crucial in expanding coverage.

Only a small number of farmers (510 individuals) are fully insured. This highlights a limited uptake of comprehensive insurance, possibly due to costs, lack of trust, or perceived low benefits. A somewhat larger group (1211 individuals) is partially insured, suggesting that while some protection is in place, it may not be adequate to cover all potential risks. This indicates that while there is some level of engagement with insurance, it may need to be expanded to ensure more comprehensive coverage.

The data underscores the need for policy interventions that promote insurance coverage, such as awareness campaigns, more affordable insurance products, and greater accessibility for small ruminant farmers to reduce their vulnerabilities.

FEED & FODDER

The bar chart depicting the type of feed and fodder used by small ruminant farmers reveals clear preferences and potential gaps in nutritional practices.



A majority of farmers rely on green fodder, followed closely by dry fodder, indicating that traditional, readily available feed sources form the backbone of feeding practices in small ruminant farming. These types are typically lower in cost and easier to access, especially in rural or semi-rural areas where such resources can be cultivated or procured locally.

However, the use of mineral mixtures and concentrated feed types like Total Mixed Ration (TMR) or silage is significantly lower. This suggests that only a small fraction of farmers are incorporating scientifically balanced or processed feed options into their livestock management. The limited adoption of these nutritionally dense supplements may be due to several factors, including lack of awareness, limited access, higher cost, or inadequate extension services promoting their benefits.

The low use of mineral mixtures is particularly noteworthy, as these are critical for animal health, reproduction, and productivity. Similarly, silage and TMR—while offering consistent nutritional quality and ease of storage—remain underutilized, pointing to a need for improved education and supply chain support to promote their benefits.

Overall, the data reflects a dependence on conventional feeding methods and highlights an opportunity for targeted interventions that can help farmers upgrade their feeding practices through training, demonstrations, and improved access to balanced and fortified feed options.

ECONOMY

The income-expenditure matrix for small ruminant farmers in Andhra Pradesh reveals a pronounced financial asymmetry, marked by over-expenditure trends and income volatility. Based on data from 9,348 farmers, the analysis underscores systemic vulnerabilities that challenge the financial sustainability of livestock-based livelihoods.

Income Vs Expenditure among Small Ruminant Farmers									
Annual Expenditure	Annual Income								Grand Total
	0	>3 Lakh	3-5 Lakh	5-10 Lakh	10-20 Lakh	20-50 Lakh	50 Lakh to 1 Cr	1-1.5 Cr	
3-5 Lakh	14	377	155	141	90	58	25		860
>5 Lakh	67	1849	1104	1670	1067	512	139	3	6411
5-10 Lakh	7	248	258	477	358	212	33	2	1595
10-20 Lakh	9	39	55	83	79	48	8		321
20-50 Lakh	1	16	16	36	30	17	4		120
50 Lakh to 1 Cr		1	5	6	7	8	4		31
1-1.2 Cr		2	1	3	1	2	1		10
Grand Total	98	2532	1594	2416	1632	857	214	5	9348

A significant proportion of farmers—6,411 individuals (nearly 69% of the sample)—reported annual expenditures exceeding Rs.5 lakh, despite a large concentration in lower income brackets. For instance, within the income category of Rs.3–5 lakh, 1,104 farmers reported spending over Rs.5 lakh annually. Similarly, in the Rs.5–10 lakh income group, 1,670 farmers reported expenditures exceeding their income level, and 1,067 farmers even reported expenditures above Rs.10 lakh. These mismatches point to widespread over-extension of household budgets, which may be driven by rising costs of feed, healthcare, market access, or infrastructure investments related to livestock rearing.

On the other hand, only 860 farmers fell into the relatively balanced band of earning and spending within the Rs.3–5 lakh range, suggesting that fiscal equilibrium is rare among the surveyed population. The table also shows that the highest income groups (Rs.50 lakh to Rs.1 crore and above) have negligible representation, emphasizing that wealth concentration is minimal in this segment and that very few livestock farmers are scaling operations to enterprise levels.

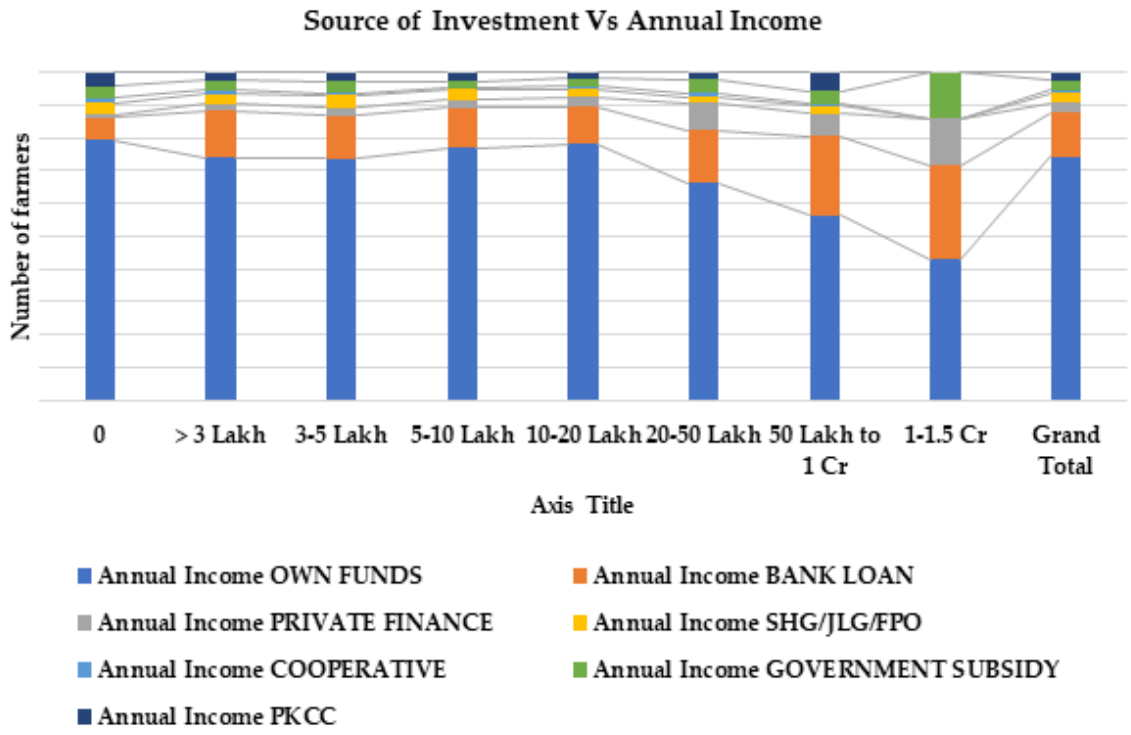
The absence of entries in the lower expenditure brackets for higher income groups suggests that surplus generation is uncommon or that higher income, when achieved, is likely reinvested into operations or offset by high recurrent costs. This also implies a low capacity for saving or capital accumulation, leaving most smallholder livestock farmers vulnerable to shocks such as disease outbreaks, market fluctuations, or climate variability.

These findings highlight the pressing need for policy interventions that go beyond income enhancement. While improving market linkages and production efficiency remains important, the data calls for (i) Financial literacy programs to enable better budgeting and expense management, (ii) Affordable and accessible credit mechanisms, such as simplified access to Pashu Kisan Credit Cards (PKCCs) and tailored livestock finance tools, (iii) insurance coverage expansion, given its low uptake, to shield farmers from catastrophic financial events, and (iv)Subsidies or input support to reduce the operational burden, particularly for feed, veterinary care, and breeding services.

In conclusion, the income-expenditure profiles of small ruminant farmers present a compelling case for integrated financial and policy support that enables not just income generation, but long-term resilience and sustainability in livestock farming. The fiscal stress reflected in this data is a reminder that entrepreneurial growth in the livestock sector must be underpinned by stronger safety nets and capacity-building systems that can buffer against economic instability.

SOURCE OF INVESTMENT & ANNUAL INCOME

The graph illustrates the correlation between different sources of investment and the annual income categories of farmers, highlighting key trends in financial behavior across income levels. Investment sources include Own Funds (blue), Private Finance (orange), Bank Loans (gray), Cooperatives (light blue), and Government Subsidies (green).



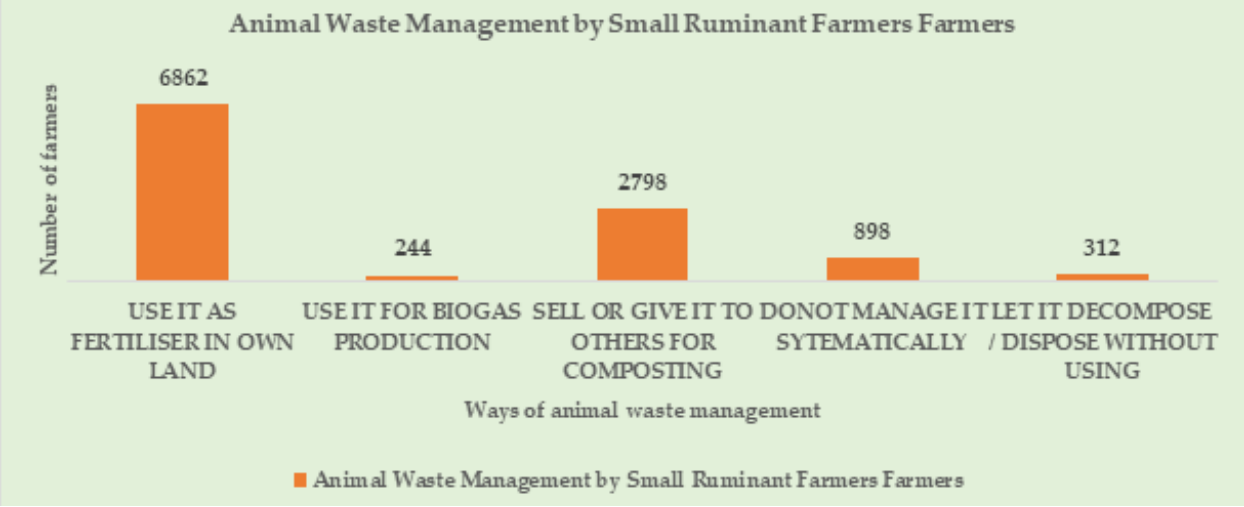
At the lower end of the income spectrum—specifically in the 0 to 3 lakh category—farmers predominantly rely on their Own Funds to finance their operations. Private Finance and Bank Loans also play a role, though to a lesser extent. As we move into higher income brackets, from 3 lakh up to 1 crore, there is a notable shift: while Own Funds continue to be a principal source of investment, the role of Bank Loans and Private Finance becomes increasingly significant. This pattern suggests a growing access to and reliance on institutional and semi-institutional credit as farmers scale up their operations.

In the highest income categories, such as 50 lakh to 1 crore and 1 to 1.5 crore, farmers demonstrate a more diversified investment portfolio. In these segments, there is increased utilization of Bank Loans and Government Subsidies, alongside continued reliance on Own Funds and Private Finance. This diversification likely reflects both the greater creditworthiness of high-income farmers and the more complex financial needs of large-scale or commercial farming enterprises.

The distribution of farmers across income categories further underscores how access to various forms of finance evolves with rising income. Overall, the graph underscores a clear trend: as income increases, farmers tend to diversify their sources of investment, moving from reliance on personal funds toward broader engagement with formal and informal financial institutions. This trend highlights both the opportunities for financial inclusion and the ongoing need to strengthen institutional credit mechanisms for all farmer segments.

ANIMAL WASTE MANAGEMENT

The data illustrates various strategies employed by small ruminant farmers in managing animal waste, reflecting both traditional practices and modern approaches. A significant portion, 6,862 farmers, repurpose animal waste directly as fertilizer on their lands, emphasizing a sustainable practice that enhances soil fertility and supports agricultural productivity. This indicates a deep integration of waste management with farming routines.



Meanwhile, a smaller segment of 244 farmers engages in biogas production, signaling a move towards innovative and environmentally friendly energy solutions. This approach not only helps manage waste but also provides an alternative energy source.

Additionally, 2,798 farmers participate in selling or giving away waste for composting, fostering a sense of community and cooperation. This method likely benefits those with limited land or resources, expanding the utility of waste management beyond individual farms.

On the other hand, 898 farmers do not manage their waste systematically, which could lead to environmental or health issues, highlighting a need for education or support in waste management practices. Furthermore, 312 farmers simply allow waste to decompose or dispose of it without utilizing its potential, perhaps due to a lack of resources or awareness about beneficial uses.

Overall, the table underscores a strong emphasis on sustainable practices, but also points to areas where improvements and education could enhance waste management strategies across the board.

INCOME FROM BY-PRODUCTS

The data provides a comprehensive overview of the income generated by small ruminant farmers from different by-products associated with their farming activities. The most substantial source of income comes from the sale of manure or compost, which brings in 5,174 units. This highlights the significant economic value that farmers derive from managing animal waste effectively, turning what could be waste into a lucrative product that supports their livelihood.

Following manure or compost sales, the sale of breeding stock contributes 765 units, indicating that some farmers focus on reproductive management and selling breeding animals as an additional income stream. The sale of biogas or biogas slurry provides 220 units, reflecting an interest in utilizing waste for renewable energy and its by-products.

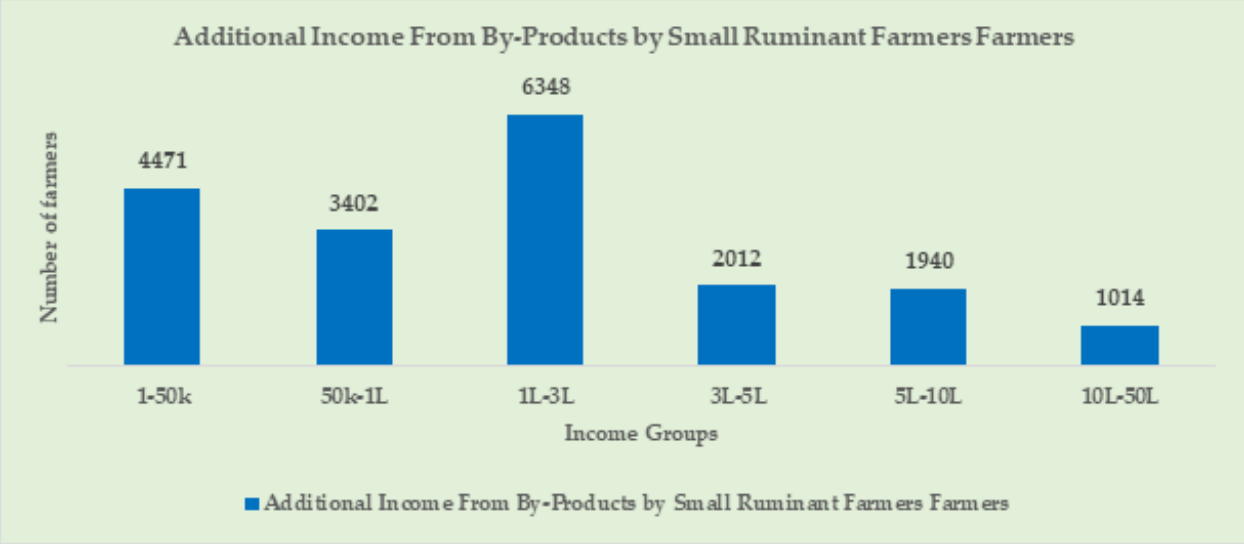
The sale of value-added products, such as processed or packaged items derived from animal products or waste, accounts for 163 units, suggesting a smaller but notable effort by some farmers to diversify their income sources through value addition.

However, a significant number of farmers, totaling 4,030, have no secondary source of income from by-products. This could imply that many farmers rely solely on primary outputs like meat, milk, or wool, and do not capitalize on the potential income from waste management or value addition. It might also point to a gap in knowledge, resources, or market access needed to exploit these by-products effectively.

Overall, the data underscores the importance of manure or compost sales as a primary income source, illustrating the economic potential of proper waste management in small ruminant farming. It also highlights opportunities for farmers to diversify further by expanding activities like breeding, biogas production, or value addition, which could improve their income stability and sustainability.

ADDITIONAL INCOME FROM BY-PRODUCTS

The table provides insight into the additional income farmers earn from by-products of small ruminant farming, highlighting the varying levels of financial benefits derived from these secondary products.



The majority of farmers, totaling 6,348, generate an income of between one lakh to three lakh from their by-products. This suggests that a significant portion of farmers are able to capitalize effectively on their waste and by-product management, turning them into a moderate but steady source of income.

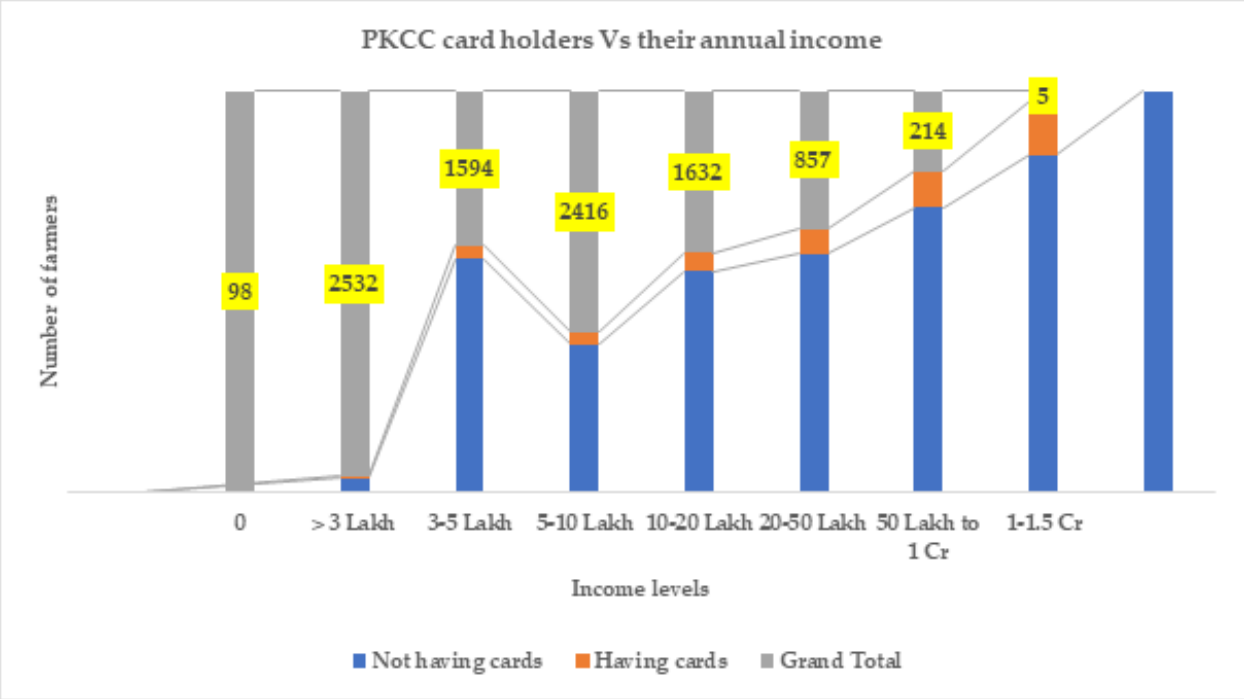
A smaller group of 3,402 farmers earns between INR 50,000 to 1,00,000, indicating that some farmers are able to earn higher incomes, possibly through larger-scale operations or more efficient utilization of by-products. The lowest income bracket, INR 1 to 50k, is represented by 4,471 farmers, reflecting that some small-scale or less-efficient farmers might be earning minimal supplementary income from their by-products.

The data also references larger quantities such as 3 Lakh and above, but specific income details for these categories are not fully visible. Nonetheless, the trend suggests that income tends to increase with the volume of by-products utilized or sold.

Overall, this distribution illustrates that while many farmers earn modest amounts from their by-products, a substantial number are generating moderate to high income levels, demonstrating the significant economic potential of proper waste management and by-product utilization. The variation in income levels underscores the importance of scale, efficiency, and market access in maximizing benefits from small ruminant by-products.

PKCC CARDS HOLDERS Vs ANNUAL INCOME OF FARMERS

The chart titled "PKCC Card Holders vs Their Annual Income" reveals a significant gap in access to formal credit among livestock farmers across various income levels in Andhra Pradesh.



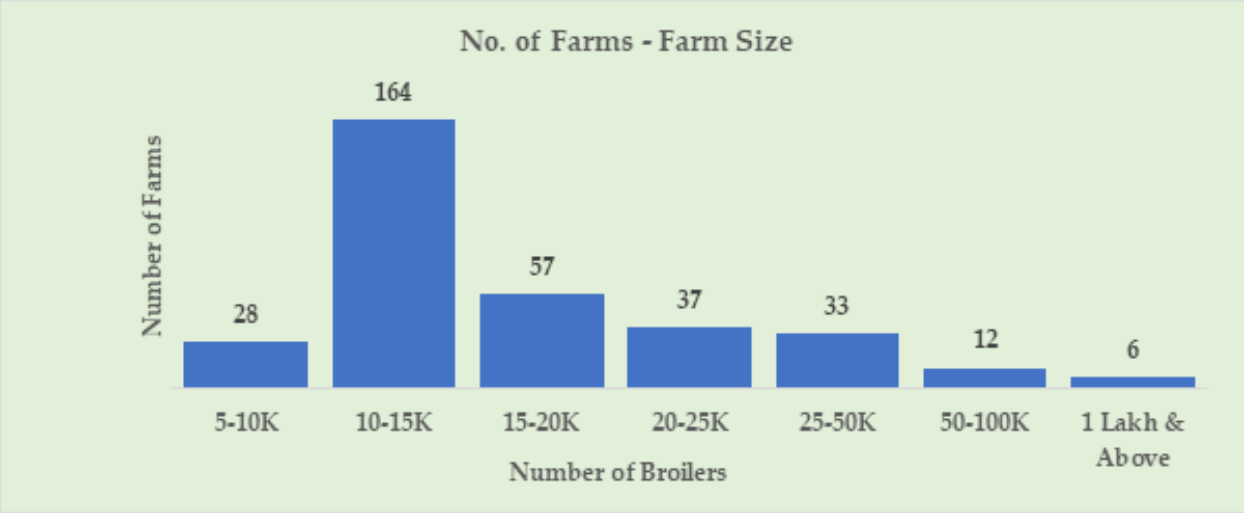
Despite the availability of the Pradhan Mantri Kisan Credit Card (PKCC) scheme, the data clearly shows that the majority of farmers in every income group do not possess a PKCC card. This trend is especially stark in the Rs.5–10 lakh and Rs.10–20 lakh annual income categories, which represent the largest segments of the farming population. Even in these relatively better-off segments, the uptake of PKCC remains low, pointing to barriers such as limited awareness, procedural complexity, or perceived inaccessibility of the scheme.

Farmers in the lowest (Rs.0–3 lakh) and highest (>Rs.50 lakh) income brackets show minimal engagement with the scheme, indicating a potential disconnect between credit offerings and the unique needs of both marginal and high-income farmers. The underutilization of PKCC among mid-income farmers is particularly concerning, as this group is often most in need of affordable working capital to sustain and scale their operations.

The findings underline an urgent need for targeted policy intervention to enhance the reach and relevance of formal credit instruments like the PKCC. This includes simplifying access procedures, increasing financial literacy, and tailoring credit products to suit the livestock sector's specific realities. Without such measures, a large proportion of livestock farmers will continue to rely on informal sources of finance, undermining their financial resilience and long-term growth potential.

POULRTY FARMERS (BROILER FARMES)

The distribution of poultry farms (broilers) capacity in Andhra Pradesh shows a clear dominance of mid-scale operations. The majority of farms—164 out of the total sample—operate within the 10,000 to 15,000 broilers category, indicating a preference for a scale that balances profitability with manageable operational demands.



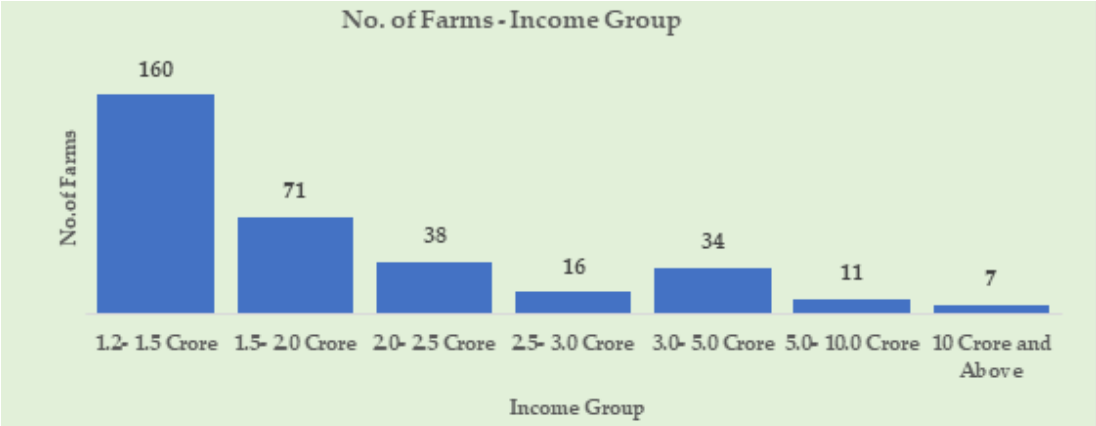
Smaller farms (5,000–10,000 broilers) are relatively fewer in number (28 farms), which may suggest limited viability at that size due to economies of scale or market access constraints. As we move up the scale, the number of farms declines consistently—57 farms operate at 15K–20K capacity, 37 farms at 20K–25K, and 33 farms between 25K–50K.

Interestingly, only 12 farms operate at the 50K–100K level and a mere 6 farms exceed 1 lakh broilers. This sharp drop-off highlights barriers to scale, including access to working capital, biosecurity compliance, skilled labor, and market linkages.

In summary, Andhra Pradesh's broiler sector is largely built on mid-sized farms, with very few scaling up to large, commercial operations. Strategic interventions—such as cluster-based infrastructure, contract farming models, and working capital schemes—will be essential to help capable mid-sized farms transition into high-volume enterprises.

INCOME GROUP

The bar chart on the number of farms across income groups reveals a highly skewed distribution, with a majority of farms concentrated in the lower income bracket of Rs.1.2–1.5 crore annually.

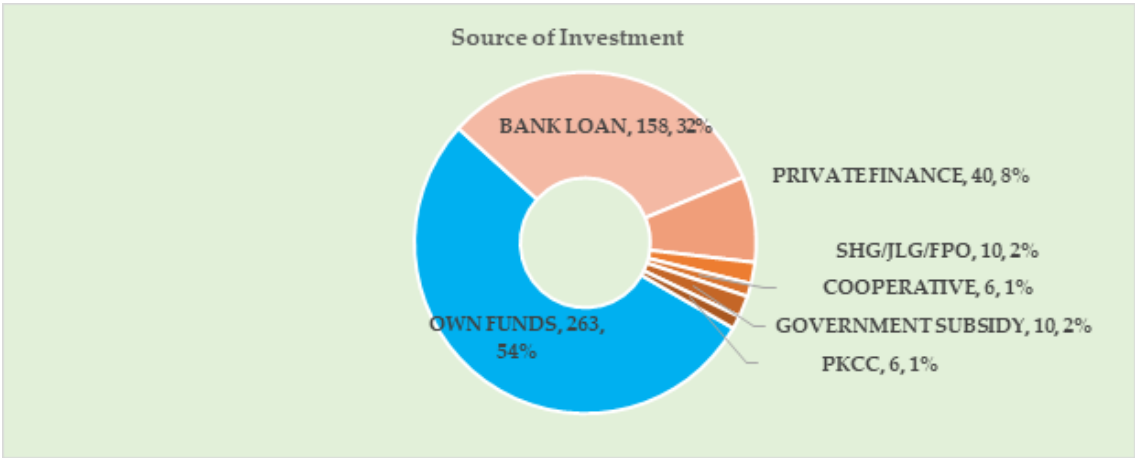


Specifically, 160 farms fall into this category, making it the most dominant group by far. As income levels rise, the number of farms decreases sharply—only 71 farms earn between Rs.1.5–2.0 crore, and the number continues to drop across subsequent brackets, with just 7 farms reporting incomes of Rs.10 crore and above.

This distribution suggests that while a large number of farms operate within the lower revenue range, only a small fraction achieve high-income status, pointing to a narrow base of commercial scalability. Interestingly, there is a slight uptick in the Rs.3.0–5.0 crore group (34 farms), compared to the Rs.2.5–3.0 crore group (16 farms), indicating some potential for growth among mid-tier farms. However, the overall trend reflects a steep income pyramid, where very few farms break through into higher income tiers.

This pattern underscores the need for targeted interventions to support income diversification, scale expansion, and market access—particularly for farms in the lower and middle income brackets—to foster a more balanced and inclusive agricultural economy.

SOURCE OF INVESTMENT



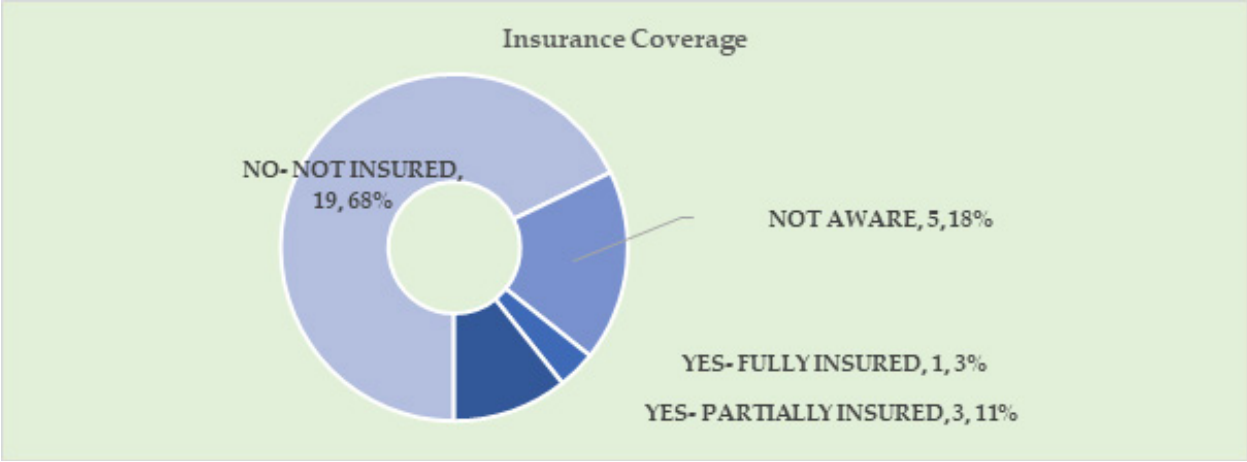
The chart on the source of investment highlights a clear reliance on self-financing among farmers, with 54% (263 individuals) using their own funds to support agricultural operations. This dominant share suggests that most farmers either prefer to avoid debt or face limited access to institutional credit. Bank loans are the second most common source, used by 32% (158 farmers), indicating a moderate level of engagement with formal financial institutions. However, this also implies that a significant portion of the farming community remains outside the purview of structured credit systems.

Private finance accounts for 8% (40 farmers), reflecting the role of informal lenders or non-banking sources that may be more accessible but potentially more expensive. Other sources such as Self Help Groups (SHGs), Joint Liability Groups (JLGs), Farmer Producer Organizations (FPOs), government subsidies, cooperatives, and the Kisan Credit Card (PKCC) each contribute only 1–2% of the investment landscape. This limited usage suggests that group-based financial mechanisms and public sector schemes are underutilized, possibly due to lack of awareness, eligibility barriers, or cumbersome processes.

Overall, the data underscores a strong dependence on personal capital and a need to expand access to diverse and affordable financing options, especially among small and mid-sized farmers who may struggle to scale operations or adopt modern practices without institutional support.

INSURANCE COVERAGE

The chart on insurance coverage among farmers paints a concerning picture of financial vulnerability and limited risk mitigation in the agricultural sector



A substantial 68% of farmers reported having no insurance coverage at all, meaning the vast majority are fully exposed to potential losses arising from unpredictable events such as crop failures, animal disease outbreaks, natural disasters, or market shocks. This lack of coverage implies that many farmers may struggle to recover from such incidents, potentially pushing them into debt or even out of farming altogether.

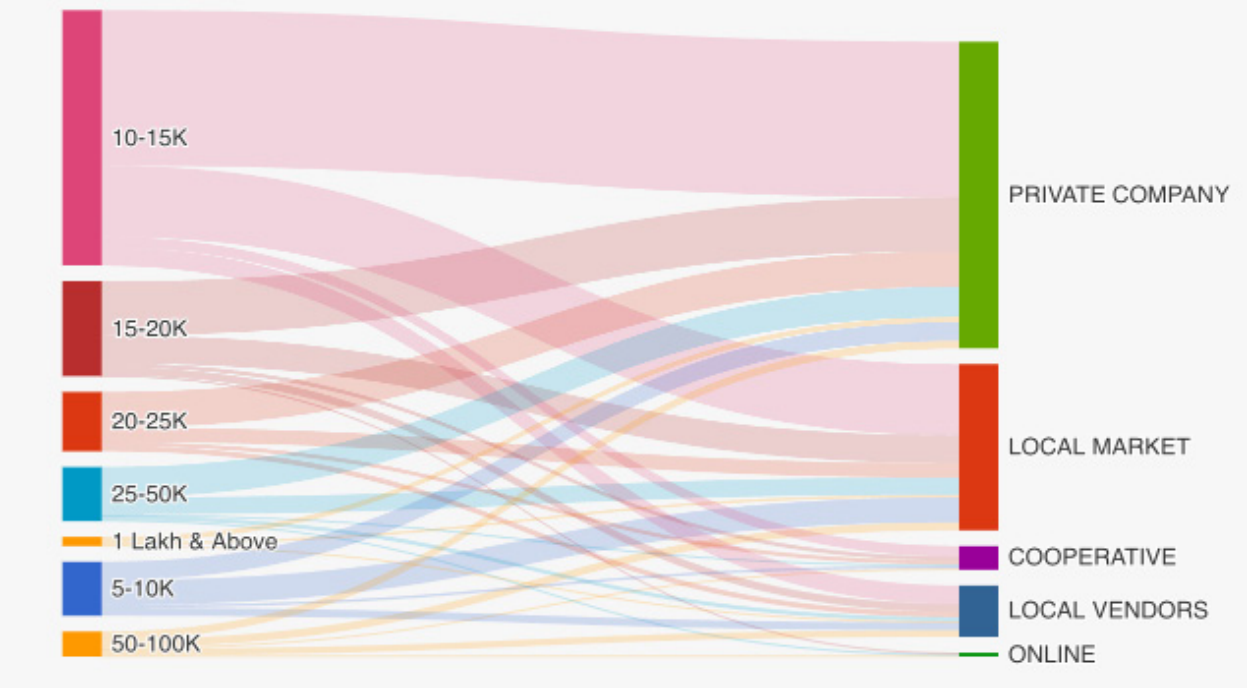
Equally alarming is that 18% of respondents are not even aware of insurance options, suggesting a serious gap in communication, outreach, and education regarding the availability and benefits of agricultural insurance. This lack of awareness not only limits the uptake of insurance products but also reflects broader issues around access to financial literacy and institutional support systems in rural areas.

On the other end of the spectrum, only a tiny fraction—3% of farmers—reported being fully insured, while another 11% have partial insurance coverage. These low figures indicate that even where insurance schemes exist, barriers such as complicated enrollment processes, lack of trust in insurers, affordability concerns, or previous negative experiences might be preventing wider participation. It's also possible that insurance products are not tailored effectively to the needs of small and marginal farmers, reducing their perceived value.

Overall, the data underscores the urgent need for targeted interventions to enhance insurance literacy, simplify access to insurance products, and perhaps even integrate insurance with other schemes like bank loans or government subsidies. Doing so could greatly improve the financial resilience of farmers, especially in the face of climate change and increasingly volatile agricultural markets.

MARKETING

The Sankey diagram illustrates the relationship between different income groups and the market channels they engage with, likely in the context of selling or sourcing agricultural or livestock products.



Farmers earning between Rs.10,000 and Rs.15,000 per month show a strong reliance on private companies, with a large portion also interacting with local markets. This indicates a dependence on established institutional players and local trade networks among lower-income groups. As income increases, particularly in the Rs.15,000–Rs.25,000 and Rs.25,000–Rs.50,000 ranges, the flow diversifies slightly, with a noticeable though still secondary shift toward cooperatives and local vendors. However, private companies and local markets remain the dominant channels across most brackets.

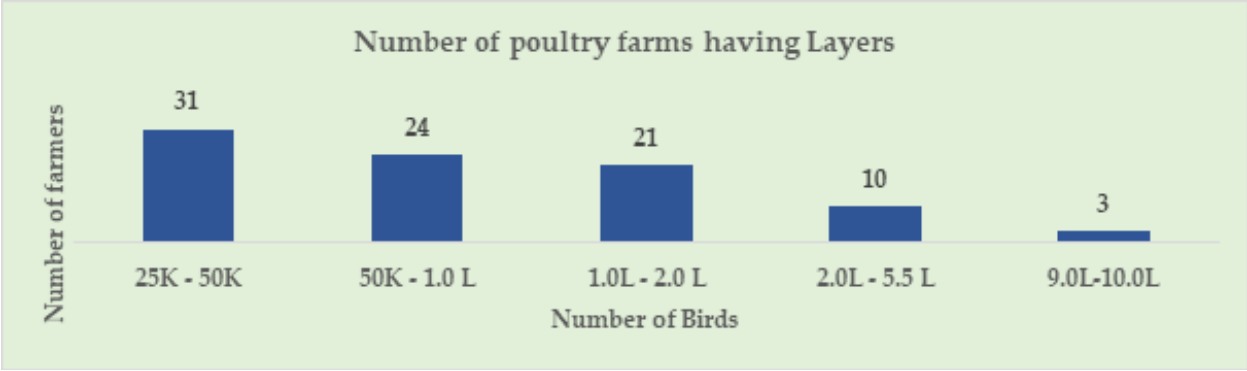
Interestingly, farmers in the highest income groups—Rs.50,000–Rs.100,000 and Rs.1 lakh and above—show more dispersed interactions across all available channels, including online platforms, albeit in smaller volumes.

This suggests that higher-income farmers are more open to exploring varied and possibly more efficient or profitable marketing avenues. On the other hand, cooperatives and online platforms see limited use overall, pointing to potential underutilization or access barriers.

Overall, the diagram highlights that lower-income farmers are more dependent on a narrow set of market options, while higher-income groups exhibit greater market engagement diversity. This pattern could reflect differences in awareness, access, bargaining power, or infrastructure support among the income segments.

POULRTY FARMERS (LAYERS FARMES)

The distribution of poultry farm sizes, measured by the number of layer birds (k), offers a clear picture of the structure and scale of poultry enterprises.



The distribution of poultry farm sizes, measured by the number of layer birds (k), offers a clear picture of the structure and scale of poultry enterprises in the surveyed region. Among the 89 farms surveyed, the largest proportion—31 farms—operate with flocks between 25,000 to 50,000 layers, followed by 24 farms in the 50,000 to 1 lakh layer range. Together, these mid-sized operations represent more than 60% of all farms, suggesting that the majority of poultry farming in this region is conducted at a commercial scale, but not at the highest industrial levels.

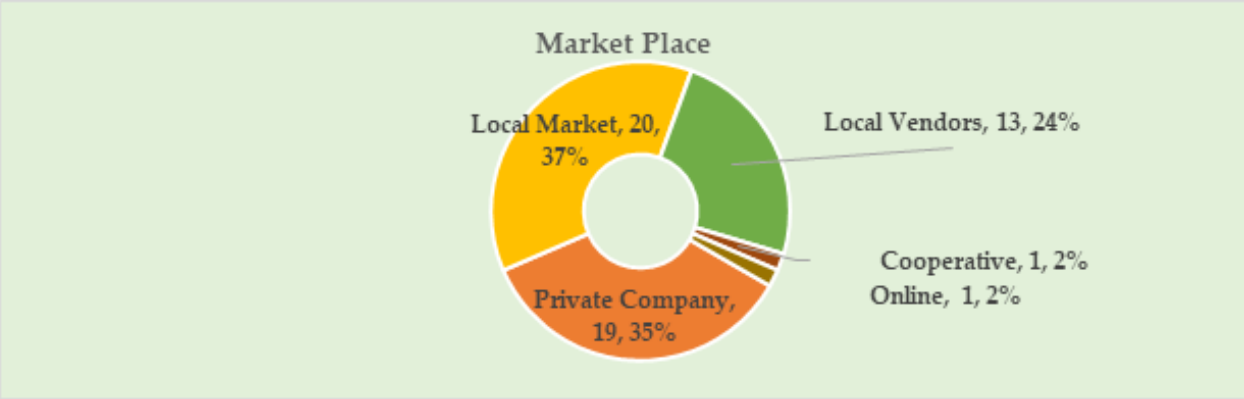
As flock size increases, the number of farms decreases. Only 21 farms have between 1 lakh and 2 lakh layers, and 10 farms operate at the 2 lakh to 5.5 lakh layer scale. Notably, just 3 farms have very large flocks in the 9 lakh to 10 lakh layer range, indicating a small elite of large-scale, industrial poultry operations likely benefiting from economies of scale, automation, and integrated supply chains.

This distribution suggests a pyramid structure, with a broad base of mid-level commercial farms and a very narrow top of large-scale operators. Most farms are likely to be regionally significant, professionally managed units, though perhaps lacking the full infrastructure and capital intensity of vertically integrated national-level poultry firms.

The data has important policy and business implications. First, the dominance of mid-scale farms presents an opportunity for productivity gains through technical support, disease control, and better feed management. Second, there is a case for promoting cluster-based models or cooperatives to help these farms achieve scale advantages in procurement and marketing. Finally, the few high-capacity farms could serve as innovation anchors or training hubs for surrounding smaller operations, helping diffuse best practices and advanced technologies across the sector.

MARKET PLACE

The analysis of marketing channels used by farmers to sell their produce reveals a strong reliance on traditional and semi-formal systems.



The analysis of marketing channels used by farmers to sell their produce reveals a strong reliance on traditional and semi-formal systems. A significant proportion of farmers—37%—prefer to sell in the local market, making it the most commonly used outlet. This indicates the importance of proximity, ease of access, and quick cash transactions in influencing farmers' choice of marketplaces. Close behind, 35% of farmers engage with private companies, suggesting a growing trend toward formal marketing arrangements such as contract farming, bulk procurement, or sales to processing firms. This reflects a level of commercialization and integration with larger value chains, though it may also come with concerns about negotiation power and contract terms.

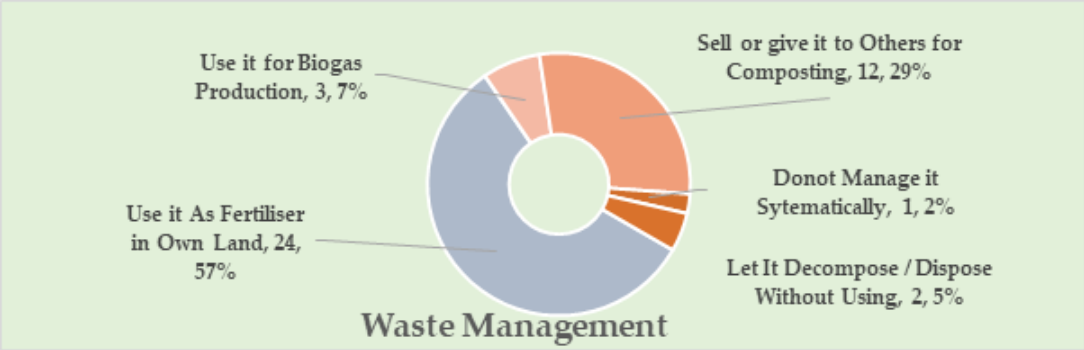
Meanwhile, 24% of farmers rely on local vendors, a channel typically characterized by informal arrangements and limited price transparency. Although convenient, such transactions often offer limited margins to producers. Notably, organized platforms such as cooperatives and online marketplaces remain marginal, with only 2% of farmers using each. This extremely low adoption suggests significant barriers to entry—such as lack of awareness, infrastructure, or digital literacy—but also reveals untapped potential to improve price realization and market efficiency.

Overall, the data suggests that while private sector participation is relatively strong, the overall marketing ecosystem for livestock and poultry produce is still dominated by informal and local mechanisms.

Strengthening collective marketing institutions like cooperatives and FPOs, and promoting digital market linkages, could provide farmers with greater bargaining power, market reach, and income stability.

WASTE MANAGEMENT

The waste management practices adopted by farmers show a strong inclination toward productive and sustainable use of livestock waste, with varying degrees of efficiency and structure.



A majority of farmers—57%—reported using waste as fertilizer in their own land, reflecting an environmentally friendly and economically beneficial practice that supports soil health and reduces dependence on chemical fertilizers. This also highlights the traditional practice of nutrient recycling that remains relevant and widely used.

Another 29% of farmers either sell or give the waste to others for composting, indicating a semi-commercial or community-based approach to waste management. This points to potential for expanding organic input markets and suggests that composting is recognized as a valuable secondary use, even if not directly utilized on-farm.

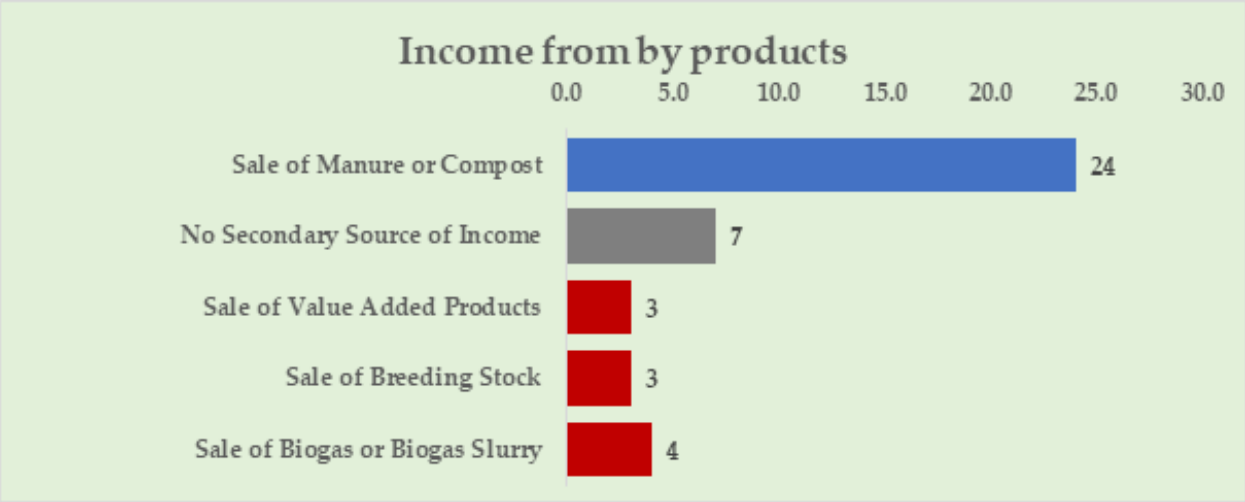
A smaller segment—7% of respondents—reported using waste for biogas production, showing limited uptake of renewable energy technologies. This low adoption could be due to cost, lack of technical knowledge, or infrastructural barriers, despite the clear environmental and economic benefits of biogas.

On the less efficient end of the spectrum, 5% of farmers let the waste decompose or dispose of it without use, and 2% do not manage it systematically, indicating gaps in awareness, resources, or motivation. These practices represent lost opportunities both economically and environmentally, potentially contributing to pollution or health hazards.

Overall, the data indicates that while the majority of farmers engage in sustainable waste reuse, especially through direct application in agriculture, there remains substantial potential to improve outcomes by promoting biogas adoption, expanding composting infrastructure, and targeting awareness campaigns to eliminate non-systematic disposal practices.

INCOME FROM BY-PRODUCTS

The data on income from by-products highlights that the sale of manure or compost is by far the most common and significant secondary income source for farmers, with 24 respondents reporting earnings from this stream.



This underscores the critical role of manure management and composting not only in sustainable agriculture but also as a viable income-generating activity. It suggests that many farmers are either selling to local markets or using structured compost systems to convert waste into value.

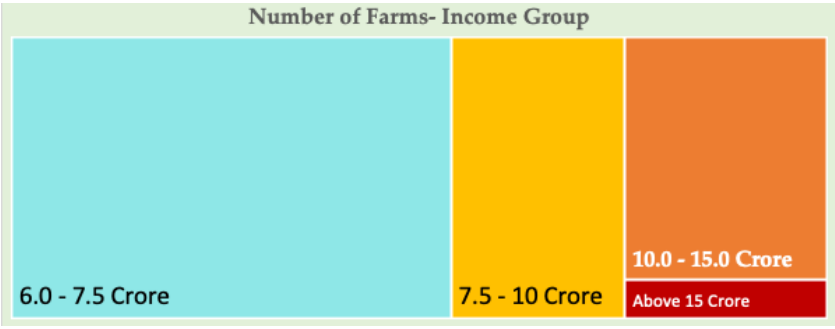
By contrast, 7 farmers indicated having no secondary source of income, pointing to missed opportunities for income diversification. This could be due to limited access to markets, lack of awareness, or small-scale operations that do not generate sufficient surplus.

Other income avenues such as the sale of biogas or biogas slurry (4 respondents), value-added products (3 respondents), and breeding stock (3 respondents) are much less common. These lower figures suggest that enterprise-level diversification beyond manure remains underdeveloped, likely constrained by lack of technical know-how, processing infrastructure, or market linkages.

Overall, the data suggests a dominance of low-hanging opportunities like manure sales, while more complex or higher-value by-product ventures are yet to gain traction. With targeted training, investment in rural processing units, and better market access, farmers could unlock additional income from these lesser-utilized by-products, thereby improving livelihoods and promoting circular agriculture.

INCOME GROUPS

The visual representation of income groups among farms reveals a concentration of farm earnings within specific income brackets, indicating disparities in scale and profitability across operations.



The largest proportion of farms fall within the Rs.6.0 to Rs.7.5 crore annual income group, highlighting this as the most common revenue range and suggesting a cluster of medium- to upper-mid-scale enterprises that dominate the sector.

Farms earning Rs.7.5 to Rs.10 crore and Rs.10 to Rs.15 crore follow next in prominence, with a visibly smaller share, reflecting a more limited number of higher-earning farms. These groups likely represent better-resourced and more integrated operations, possibly with stronger market linkages, economies of scale, or diversified product lines.

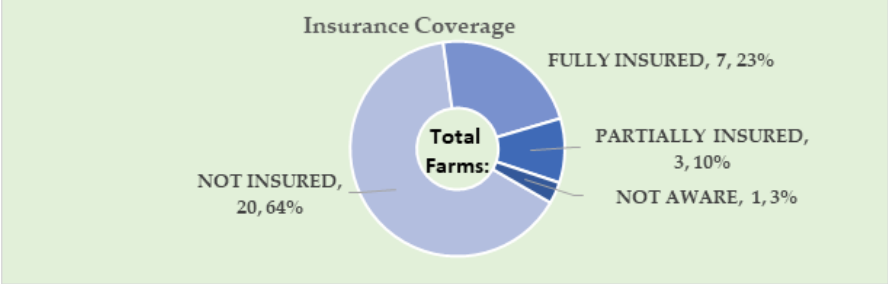
Only a very small fraction of farms exceed Rs.15 crore in annual income, indicating the rarity of ultra-large commercial operations in the surveyed sample. This sharp tapering at the top end of the income spectrum suggests that while a few elite farms operate at industrial scale, the bulk of enterprises remain within the mid-income range.

Overall, the data shows a right-skewed income distribution, with most farms clustered at moderate income levels and relatively few achieving very high annual revenues.

This pattern underscores the importance of targeted interventions—such as access to credit, technology, and high-value markets—to help mid-sized farms scale up sustainably and to close the productivity and profitability gap between the top and the middle tiers.

INSURANCE COVERAGE

The data on insurance coverage among farms reveals a significant gap in risk mitigation practices.



Out of the 89 farms surveyed, a striking 64% (20 farms) are not insured, exposing a large segment of the sector to financial vulnerability in the event of disease outbreaks, natural disasters, or market shocks. This high level of uninsured farms reflects either limited access to insurance services, lack of awareness, or low trust in existing insurance schemes.

Only 23% (7 farms) reported being fully insured, indicating a relatively small proportion of farms that are adequately protected against major risks. An additional 10% (3 farms) are partially insured, suggesting some level of coverage, possibly for specific risks such as livestock mortality or property damage, but not comprehensive protection.

Alarmingly, 3% (1 farm) is not even aware of their insurance status, pointing to information gaps or weak financial literacy in some cases.

Overall, the data underscores a pressing need to improve awareness, accessibility, and trust in agricultural insurance products.

Expanding insurance literacy, simplifying policy processes, and integrating insurance with credit or input services could significantly enhance resilience in the farming sector. Ensuring broader coverage would not only protect farmer livelihoods but also stabilize rural economies during adverse events.

CONCLUSIONS & POLICY MESSAGES

Chapter Summary

This chapter presents findings from a rapid survey of 24,360 progressive livestock farmers in Andhra Pradesh who are engaged in commercial-scale operations in dairy, small ruminants (sheep/goats), piggery, and poultry (broilers and layers). These farmers represent the more enterprise-oriented tier of livestock producers in the state, often operating with greater investment, higher output expectations, and stronger linkages to input-output markets.

The study captures critical dimensions influencing the scalability of livestock enterprises: income diversification (particularly through by-products), market access, insurance coverage, technology and fodder access, and waste management practices.

Key findings include:

- By-product utilization (especially in dairy and poultry) offers modest but consistent supplementary income, mostly from manure or compost sales, though value addition and biogas potential remain underexploited.
- Waste is largely recycled as fertilizer (57%) or composted (29%), but small gaps remain in systematic management and biogas adoption.
- Market access remains traditional, dominated by local markets (37%) and private companies (35%), with minimal digital or cooperative participation.
- In poultry (layers), the majority of farms are mid-sized (25k–1L birds), with annual incomes concentrated around Rs.6–10 crore, though few exceed Rs.15 crore.
- Insurance penetration is poor, with 64% of surveyed farms uninsured, increasing their exposure to systemic risks like disease, price volatility, and climate shocks.

Conclusions

- Enterprise-level livestock farming is viable but vulnerable. Progressive farmers have built scale and profitability, especially in poultry and dairy, but often lack institutional safety nets such as insurance or market guarantees.
- Supplementary income through by-products is untapped beyond compost and manure. High-value streams like biogas, value-added dairy products, and sale of breeding stock have limited adoption due to infrastructure, market access, and know-how gaps.
- Sustainability practices like waste recycling are common, but their economic potential (especially via energy generation or commercial compost) is yet to be fully realized.
- Market linkages are weakly formalized. While local vendors and private players are key intermediaries, formal platforms (like cooperatives or digital markets) are nearly absent, limiting bargaining power and price transparency.
- Risk management is underdeveloped. The lack of comprehensive insurance and awareness poses significant threats to investment-heavy farms, especially amid rising climate variability and disease risks.

Policy Messages

- Promote by-product-based enterprises through incentives and infrastructure (e.g., for biogas units, composting hubs, value addition in dairy and poultry). Offer startup grants or viability gap funding for farmer-led initiatives.
- Expand livestock insurance schemes with simplified processes, awareness campaigns, and integration into credit and input systems. Priority should be given to covering large and mid-sized enterprises.
- Strengthen market access by:
  - Promoting producer cooperatives and FPOs in livestock sectors.
  - Facilitating direct linkages with processors and institutional buyers.
  - Investing in digital platforms for livestock marketing and traceability.
- Enhance technology adoption and input services—especially in fodder cultivation, animal healthcare, and precision livestock tools—to support efficiency and quality outcomes at scale.
- Institutionalize waste management as a revenue stream by integrating livestock farms into state-level organic input markets and decentralized renewable energy programs (e.g., through subsidies for biogas).
- Design customized enterprise-level livestock support schemes, with region-specific models that consider the unique needs of poultry, ruminants, and dairy clusters.

PART B

FROM WASTE TO WEALTH: REIMAGINING LIVESTOCK WITH CIRCULAR ECONOMY

Eco-smart Solutions for Resilient Rural Livelihoods

Introduction to the Circular Economy Among Livestock Farmers

In an era of growing environmental challenges and resource constraints, the concept of the circular economy offers a transformative approach to agricultural sustainability—particularly within the livestock sector. Unlike the traditional linear model of "take, make, dispose," the circular economy emphasizes resource efficiency, waste minimization, and regenerative practices that restore natural systems. For livestock farmers, this means moving toward integrated systems that reuse by-products, optimize inputs, and create value from what was once considered waste.

Implementing circular economy principles in livestock farming can include practices such as converting manure into organic fertilizer or biogas, feeding animals with food system by-products, and using regenerative grazing to enhance soil health and carbon sequestration. These strategies not only reduce environmental impact but also improve farm profitability and resilience. By adopting circular approaches, livestock farmers can become key contributors to a more sustainable food system—one that supports productivity while preserving the planet for future generations.

The livestock sector in Andhra Pradesh plays a critical role in sustaining rural livelihoods, ensuring nutritional security, and contributing to the state's agrarian economy. However, the traditional linear model of production—characterized by a take-make-use-dispose pattern—has resulted in challenges such as rising input costs, waste accumulation, resource inefficiency, and environmental degradation. To address these issues, the adoption of a circular economy approach in livestock management offers a promising pathway to drive sustainability, efficiency, and inclusive economic growth.

A circular economy (CE) in livestock is based on principles of resource reuse, waste minimization, nutrient cycling, and system integration. In this model, outputs from one stage of the production process become valuable inputs for another. For instance, livestock waste such as dung and urine can be converted into biogas and organic manure, while crop residues and food waste can be transformed into low-cost livestock feed. This holistic approach not only reduces environmental impact but also creates new income streams for farmers.

In Andhra Pradesh, circular economy practices can be implemented through several interconnected strategies. Nutrient recycling, for example, allows for animal waste to be processed into compost or vermicompost, enhancing soil fertility and reducing dependence on chemical fertilizers. Energy recovery through household and community-level biogas units can meet cooking fuel needs while lowering firewood use. Crop-livestock integration—such as cultivating fodder on-farm using livestock slurry—promotes self-reliance, productivity, and climate resilience. Furthermore, the reuse of livestock wastewater for irrigating fodder plots can improve water use efficiency in semi-arid districts like Anantapur and Kurnool.

A key enabler of circular livestock systems is **innovation**, which has opened up new avenues for improving efficiency and creating value from biological waste. Technologies such as modular biogas units allow even smallholder dairy farmers to convert dung into cooking gas, saving Rs.3,000–Rs.5,000 per month in fuel costs. Silage baling equipment enables the preservation of green fodder during surplus periods, ensuring consistent milk yields during dry months. Mobile composting units and feed block technology allow for on-farm conversion of residues into high-quality inputs. Additionally, low-cost liquid biofertilizers made from livestock urine are gaining traction as sustainable soil amendments.

More advanced innovations include the use of **IoT-based waste tracking systems** to optimize resource flows and reduce losses, as well as industrial upcycling of dung into fibreboards or construction panels—creating new, high-value revenue streams. Furthermore, eco-labelling and green certification (e.g., "Natural Feed", "EcoMilk") are helping circular economy-based livestock products capture premium prices in urban and export markets.

These practices result in **significant economic gains** for farmers. A household using biogas and selling compost can earn Rs.25,000–Rs.30,000 annually. Savings from homegrown fodder or recycled feed reduce input costs by Rs.12,000–Rs.18,000. Integrated farming systems combining dairy, fodder, and horticulture have shown income boosts of Rs.20,000–Rs.50,000 per acre through improved yields and resource efficiency. In some cases, the combined benefits from circular practices can increase a farmer's annual income by Rs.40,000 to Rs.1 lakh, making the model both environmentally and financially sustainable.

Andhra Pradesh is well-positioned to lead this transition. With a high livestock population, a strong rural institutional base of SHGs and FPOs, and convergence opportunities with schemes such as MGNREGS, the state can integrate circular economy models into its broader development strategy. Dairy clusters in districts like Chittoor have already demonstrated the benefits of such approaches—using community biogas systems that not only supply clean energy but also enhance farm productivity through slurry-based nutrient application.

To scale the circular livestock economy, the government should promote livestock-waste management clusters, incentivize the adoption of circular technologies, and integrate CE principles into veterinary and extension services. Decentralized models led by women's SHGs and FPOs should be encouraged to manage biogas, compost, and feed enterprises. Market linkages for circular products can be facilitated through branding, certification, and institutional procurement, while digital platforms can match waste producers with recyclers and buyers.

Emerging Circular Economy Models in Livestock: Scalable Innovations for Andhra Pradesh

The shift towards a circular economy in the livestock sector is being accelerated by a new wave of innovative, integrated models that emphasize resource efficiency, low waste, and added economic value. Andhra Pradesh, with its strong livestock base and grassroots institutions, is well-positioned to scale these models across rural landscapes. Below are some of the most promising and adaptable models.

a) One of the most impactful models is the **Integrated Bioenergy-Dairy-Fodder Model**, where cattle dung is used to generate household or community-level biogas, and the residual slurry is applied to fodder plots. This not only provides clean cooking energy and reduces household fuel costs by Rs.3,000–Rs.5,000 per month but also enriches the soil, leading to 20–30% higher yields of fodder crops such as Napier or CO-4 grass. This closed-loop system enhances livestock productivity and ensures fodder security—especially important during dry spells in districts like Anantapur and Kurnool.

b) The **Vermicomposting with SHG/FPO Marketing Model** has gained traction in coastal and delta regions. Here, women's self-help groups and farmer-producer organizations collect livestock waste, particularly cattle dung, to produce vermicompost. With minimal investment and training, these units generate branded organic fertilizer that is sold locally or through Rythu Bharosa Kendras. Annual incomes of Rs.15,000–Rs.30,000 per SHG member have been reported, while also promoting sustainable farming in surrounding areas. When combined with eco-packaging, QR code tracking, and institutional procurement, this model has the potential to become a scalable green enterprise.

c) A more technology-driven solution gaining attention is the **Smart Feed Circularity Model.** This involves converting food waste from urban sources or crop residues into protein-rich animal feed using insect bioconversion techniques, especially black soldier fly larvae. Startups in neighboring states like Telangana and Tamil Nadu have already commercialized this model. Such innovations could reduce poultry and pig feed costs by up to 40%, while simultaneously reducing municipal waste. Andhra Pradesh can pilot similar units in cities like Visakhapatnam and Vijayawada, connecting urban food waste streams to peri-urban livestock producers.

d) The **Livestock-Integrated Natural Farming Cluster Model** has already been initiated in districts like Krishna and Vizianagaram under Andhra Pradesh's Natural Farming Mission. In this model, livestock rearing is embedded into natural farming systems. Cattle dung and urine are used to prepare natural bio-inputs like Jeevamrut and Ghanajeevamrut, which replace chemical fertilizers. This closed nutrient loop improves soil health, reduces farming costs by 60–70%, and enhances crop-livestock synergy. As Andhra Pradesh aims to bring 60 lakh farmers under natural farming by 2030, this model represents the backbone of sustainable rural agriculture.

e) A market-oriented innovation is the **Green Milk or Eco-Dairy Branding Model,** where milk is certified as environmentally friendly, based on parameters like natural feed, zero antibiotics, and sustainable manure management. Inspired by pilot efforts in states like Gujarat and Sikkim, this model fetches premium prices from health-conscious urban consumers. Andhra Pradesh's dairy cooperatives such as Vijaya and private brands like Heritage have the potential to develop such eco-certified milk products, thereby increasing producer margins and market competitiveness.

f) Finally, the **Multi-Enterprise Livestock Park Model** presents a forward-looking vision where circular economy principles are institutionalized through local hubs. These village-level parks integrate several value-added activities—vermicomposting, dung-to-panel production, bio-feed block units, and basic meat/hide processing—within a zero-waste framework. They serve as employment and entrepreneurship hubs, particularly attractive to youth and SHGs. If strategically located in key livestock districts like Prakasam, Anantapur, and Chittoor, Andhra Pradesh could establish 100 such parks under convergence with MGNREGS, PM-FME, and state animal husbandry schemes.

Each of these models not only exemplifies circular economy principles in action but also demonstrates tangible economic benefits—from cost savings to income generation. By supporting these models with policy incentives, infrastructure, and capacity-building, Andhra Pradesh can build a resilient, low-carbon, and inclusive livestock sector aligned with Vision 2049 goals.

In conclusion, a circular economy approach in Andhra Pradesh's livestock sector presents a powerful opportunity to align economic growth with ecological stewardship. By turning waste into wealth, integrating farming systems, and fostering innovation, Andhra Pradesh can not only improve farm incomes and reduce rural poverty but also emerge as a national leader in sustainable livestock management.

This rapid study with 24,360 tried progressive farmers (Entrepreneurs') analysed the circular economy among dairy farmers and farmers holding small ruminants. The details are as follows:

DAIRY FARMERS - CIRCULAR ECONOMY

CIRCULAR ECONOMY FRAMEWORK					
Animal Waste Management by Dairy Farmers		Income From By-Products by Dairy Farmers		Additional Income From By-Products by Dairying Farmers	
Animal Waste Managemer	Farmers	By-Products	Farmers	Additional Income From By-Products	Farmers
USE IT AS FERTILISER IN OWN LAND	11352	SALE OF MANURE OR COMPOST	7066	1-50k	7969
USE IT FOR BIOGAS PRODUCTION	632	NO I DONOT HAVE ANY SECONDARY SOURCE OF INCOME	5323	50k-1L	2303
SELL OR GIVE IT TO OTHERS FOR COMPOSTING	3571	SALE OF VALUE ADDED PRODUCTS	2016	1L-3L	3022
DONOT MANAGE IT SYTEMATICALLY	1027	SALE OF BREEDING STOCK	2051	3L-5L	643
LET IT DECOMPOSE / DISPOSE WITHOUT USING	481	SALE OF BIOGAS OR BIOGAS SLURRY	408	5L-10L	502
				10L-50L	111

The data from dairy farmers in Andhra Pradesh reveals promising trends and critical opportunities in leveraging circular economy practices. A significant majority—11,352 farmers—use animal waste as fertilizer on their own land, underscoring the traditional but valuable practice of recycling waste to enhance soil health and reduce input costs. Another 3,571 farmers sell or give waste for composting, while 632 have adopted biogas production, indicating early adoption of renewable energy solutions. However, gaps remain—over 1,500 farmers either do not manage waste systematically or dispose of it without reuse, pointing to the need for improved awareness and infrastructure.

On the income side, over 7,000 farmers earn from selling manure or compost, and more than 2,000 generate revenue from value-added products like vermicompost, ghee, or curd. The sale of breeding stock also contributes to income for 2,051 farmers, and around 408 farmers earn from biogas or slurry sales. Still, 5,323 farmers report no secondary income from by-products, showing substantial untapped potential.

In terms of financial gains, 7,969 farmers earn between Rs.1–50K annually through by-products, and nearly 3,000 farmers earn more than Rs.1 lakh. This income distribution highlights both the scalability and feasibility of circular models when linked to proper value chains.

These insights strongly support the integration of waste-to-wealth strategies in dairy. With targeted support—such as technology access, SHG/FPO facilitation, market linkages, and policy convergence with MGNREGS and organic farming missions—Andhra Pradesh can position itself as a national leader in circular livestock development.

Focused and several deeper inferences were drawn from the data, strengthening the case for mainstreaming circular economy models in the dairy sector:

1. **Widespread Traditional Use as a Foundation:**

   The fact that over 77% of dairy farmers (11,352 out of ~14,500) use dung as fertilizer shows that the foundational behavior for circularity already exists. This practice can be easily upgraded into more structured enterprises like vermicomposting, offering both ecological and economic benefits.

2. **Low Penetration of Biogas:**

   Despite its proven utility in reducing household energy costs and improving environmental outcomes, only 632 farmers use biogas, suggesting barriers like upfront investment, lack of technical support, or poor awareness. This signals a major opportunity for public-private partnerships and SHG-led biogas promotion.

3. **Informal Waste Sharing Undermines Value Capture:**

   About 3,571 farmers give away waste or sell it unprocessed, potentially losing out on higher-value compost or biofertilizer sales. Structured aggregation and branding (e.g., SHG-led compost sales) can help capture that value locally.

4. **Lack of Secondary Income Among 36% of Farmers:**

   A major concern is that 5,323 farmers report no additional income from by-products. This reflects either limited awareness, poor access to markets, or lack of support services to convert waste into saleable products. These farmers are ideal candidates for targeted interventions.

5. **Value Addition Pays Off—Even at Small Scale:**

   Although only a small fraction of farmers engage in value-added products (e.g., curd, ghee, vermicompost), over 500 farmers earn Rs.5–10 lakh annually, and 111 farmers report Rs.10–50 lakh income from by-products. This shows the real potential of enterprise-driven circular models when integrated with quality, branding, and market access.

6. **Opportunity for Women-led Enterprises:**

   The composting, vermicompost packaging, and small-scale bio-product units align well with SHG strengths, especially in coastal and tribal districts. These models are labor-light, capital-efficient, and have growing market demand.

7. **Scalability Through Cluster Models:**

   Cluster-based interventions—like village-level dairy-circular parks—can reduce individual investment burden and build local ecosystems for input supply and output marketing.

   In summary, the data provides clear evidence that circular economy strategies are both feasible and economically rewarding. By transforming animal waste into a productive asset, Andhra Pradesh can enhance farmer incomes, reduce environmental harm, and position itself as a leader in sustainable, entrepreneurial livestock systems.

SMALL RUMINANT FARMERS - CIRCULAR ECONOMY

SMALL RUMINANT FARMERS - CIRCULAR ECONOMY FRAMEWORK					
Animal Waste Management by Small Ruminant Farmers		Income From By-Products by Small Ruminant Farmers		Additional Income From By-Products by Small Ruminant Farmers	
Animal Waste Management	Farmers	By-Products	Farmers	Additional Income From By-	Farmers
USE IT AS FERTILISER IN OWN LAND	6862	SALE OF BIOGAS OR BIOGAS SLURRY	220	1-50k	4471
USE IT FOR BIOGAS PRODUCTION	244	SALE OF BREEDING STOCK	765	50k-1L	3402
SELL OR GIVE IT TO OTHERS FOR COMPOSTING	2798	SALE OF VALUE ADDED PRODUCTS	163	1L-3L	6348
DONOT MANAGE IT SYTEMATICALLY	898	NO I DONOT HAVE ANY SECONDARY SOURCE OF INCOME	4030	3L-5L	2012
LET IT DECOMPOSE / DISPOSE WITHOUT USING	312	SALE OF MANURE OR COMPOST	5174	5L-10L	1940
				10L-50L	1014

The data on animal waste management and income from by-products among **small ruminant farmers in Andhra Pradesh** clearly aligns with the foundational principles of a **circular economy**, which focuses on minimizing waste, maximizing resource efficiency, and generating value from every stage of the production cycle.

Animal Waste as a Resource

A substantial 73% of small ruminant farmers (6,862 out of 9,214) already use animal waste as organic fertilizer on their own land, while 2,798 farmers sell or share it for composting. These practices reflect traditional yet scalable forms of nutrient recycling, which reduce reliance on chemical fertilizers, enhance soil health, and lower input costs—core elements of circularity in livestock-agriculture integration. However, 898 farmers do not manage waste systematically, and 312 dispose of it altogether, signaling a missed opportunity to convert waste into wealth and a need for stronger behavioral change and support systems.

By-Product Valorization

From the income side, 5,174 farmers earn from sale of manure or compost, and 765 from breeding stock, demonstrating tangible economic returns from what are typically seen as secondary or waste outputs. Additionally, smaller but promising segments such as biogas slurry sales (220 farmers) and value-added products like vermicompost or goat milk soap (163 farmers) highlight the potential for diversifying rural livelihoods through circular innovations.

Yet, 4,030 farmers (over 43%) report no secondary income, revealing a large group that is excluded from value-recovery opportunities. With proper training, microenterprise support, and SHG or FPO engagement, these farmers could be brought into the fold of circular models that enhance both ecological and economic resilience.

Income Gains Through Circular Practices

The income from by-products is not marginal—6,348 farmers earn Rs.1–3 lakh/year, 2,012 earn Rs.3–5 lakh, and over 1,000 farmers report incomes as high as Rs.10–50 lakh/year. ***These figures powerfully illustrate the profitability of circular economy models, particularly when linked with structured markets, branding, and technical support.***

Strategic Implications

This data reinforces the need for a livestock development strategy that is circular by design. Scaling up proven models like vermicomposting units, biogas systems, waste-to-feed conversion, and value-added livestock by-products can transform waste into new revenue streams, reduce environmental burdens, and create green jobs—especially for women and youth in SHGs and rural enterprises.

> ***The experience of Andhra Pradesh's small ruminant farmers reveals that the building blocks of a circular livestock economy are already in place. With policy support, technology integration, and market-driven scaling, these practices can transition from scattered initiatives to a statewide strategy—positioning Andhra Pradesh as a national leader in sustainable, zero-waste livestock development.***

Here are deeper inferences from the circular economy practices of small ruminant farmers in Andhra Pradesh, drawing parallels with dairy and emphasizing system-level insights:

1. **High Existing Adoption of Circular Practices – Yet Untapped Value**

   With 73% of small ruminant farmers using dung as fertilizer and over 30% selling or sharing it for composting, there is already a strong foundation of resource cycling. However, these are mostly unstructured practices. This represents an opportunity to formalize and scale these practices into organized enterprises through SHGs, FPOs, or cluster-based models, unlocking greater economic and environmental returns.

2. **Missed Opportunity in Waste Valorization**

   Nearly 900 farmers do not manage waste, and 312 dispose of it entirely—wasting potential income and ecological value. These farmers represent a critical intervention group who could be targeted for capacity building, demonstration units, and inclusion in decentralized waste management projects. Community composting centers or SHG-led aggregation units could reduce transaction costs for them.

3. **Limited By-Product Income – Scope for Rapid Upscaling**

   While over 5,000 farmers are monetizing manure and nearly 1,000 earn from high-value by-products like breeding stock or biogas slurry, a striking 43% (4,030 farmers) report no secondary income. This shows a huge exclusion gap, which if addressed, could double the sector's supplementary income and greatly enhance resilience against price shocks or disease outbreaks.

4. **By-Products Generate Meaningful Revenue, Not Just Side Income**

   A standout insight is that 6,348 farmers earn Rs.1–3 lakh/year, and more than 1,000 farmers cross Rs.5 lakh, with some even in the Rs.10–50 lakh band. This disproves the notion that circular activities are marginal or supplementary. With the right ecosystem, waste-based enterprises can be the main source of livelihood, especially for landless or marginal families relying on small ruminants.

5. **Women and SHGs: Natural Drivers of Circular Rural Economies**

   Given that goat and sheep rearing is often women-led and SHG-driven, promoting circular practices in this space is not only economically sound but gender-inclusive and empowerment-driven. Technologies like vermicomposting, herbal veterinary kits, and goat milk-based soaps and cosmetics can be easily adapted for microenterprise formats.

6. **Uneven Access to Markets and Technologies**

   While some farmers earn significantly, the lack of market access, storage, or packaging means many others remain stuck in low-value transactions. To bridge this gap, interventions must prioritize rural aggregation points, local branding, QR code traceability, and access to compost and breeding stock certification, enabling small farmers to fetch better prices.

7. **Biogas and Bioenergy: Low Penetration but High Promise**

   Only 244 farmers use dung for biogas, but their example can guide a larger push. SHG biogas units, community cookstove programs, and rural energy entrepreneurship schemes can unlock energy security, reduce LPG subsidy burdens, and lower women's drudgery—an intersection of economic, energy, and gender policy goals.

8. **Circular Models are Climate-Positive and Market-Ready**

   Most circular activities—manure composting, breeding stock sales, and feed recycling—cut emissions, enhance soil carbon, and align with global goals like Net Zero and One Health. The branding potential of 'climate-smart mutton' or 'green goat manure' is real and growing, especially in export or urban niche markets.

9. **Policy Must Move from Welfare to Enterprise Facilitation**

   Instead of subsidies or one-time inputs, the data suggests the need for a transition from input-based schemes to entrepreneurship ecosystems—credit, insurance for by-product enterprises, market incubation, and convergence with MGNREGS, NRLM, PM-FME, and Green Economy Missions.

10. **Andhra Pradesh's Edge: Scale, Data, and Institutional Platforms**

    With over 9,000 small ruminant entrepreneurs already involved and solid SHG infrastructure, Andhra Pradesh is uniquely placed to institutionalize circularity in livestock. By building on this data, the state can design district-specific circular livestock clusters, positioning itself as a national and global pioneer in regenerative rural livestock systems.

These inferences strongly reinforce the narrative that circular livestock development is not aspirational—it is already underway in Andhra Pradesh. The challenge now is to amplify, formalize, and scale this silent revolution through policy, partnerships, and innovation.

PART C

GRASSROOTS TO GROWTH: A STATEWIDE SURVEY OF LIVESTOCK LIVELIHOODS IN ANDHRA PRADESH

This landmark study captures insights from over 100,000 livestock farmers across Andhra Pradesh, including both Self-Help Group (SHG) members and non-SHG farmers. By examining patterns in animal ownership, income, investment, insurance, technology, credit, and access to fodder and healthcare, the study provides a comprehensive understanding of rural livelihoods anchored in livestock. It highlights key differences and common challenges across farmer segments, offering evidence-based insights to inform inclusive, sustainable, and scalable livestock development strategies in the state.

1 PROFILE OF LIVESTOCK FARMERS

Understanding the Keepers of Livelihood: Demographics, Diversity, and Dynamics

This chapter analysed the demographic and socioeconomic profiles of livestock farmers in Andhra Pradesh to inform targeted interventions. Key variables include age, gender, caste, education, marital status, family structure, and access to mobile technology and Aadhar, which reveal the farmers' capabilities and barriers. Insights into household size and land ownership inform labor dynamics and agrarian foundations of livestock activities. The chapter distinguishes between Self-Help Group (SHG) members, particularly women, to assess the impact of collective action on access to services and income. It also examines educational backgrounds and occupational diversification, highlighting adaptive capacities and rural livelihood resilience. Ultimately, the chapter aims to establish a baseline profile of livestock farmers to guide socially inclusive and gender-sensitive policy recommendations.

KEY FINDINGS

The survey involved 101,657 livestock farmers in Andhra Pradesh, with 40% being Self-Help Group (SHG) members and 60% non-SHG farmers. SHGs are important for providing credit, training, and market access, especially for small farmers, highlighting the need for dual strategies to support both groups.

The livestock sector is primarily smallholder-driven, with buffaloes outnumbering cows due to their higher milk fat content. There are 89,944 dairying farmers, averaging four animals per household, which limits economies of scale, but also presents opportunities for targeted interventions.

Breed improvement has had moderate success, particularly with crossbred cows and graded buffaloes, though many sheep and goats remain mixed breeds. Milk yield varies across the state, with lower yields in the north (1.0–2.9 L/day) compared to higher yields in the south (4.0–5.4 L/day). Addressing these disparities is essential for enhancing dairy productivity throughout the state.

LANDSCAPE OF THE ANDHRA PRADESH LIVELIHOOD SECTOR

Under the dynamic leadership of Shri N. Chandrababu Naidu, the livestock sector in Andhra Pradesh is poised for a transformative leap, emerging as a central pillar of rural prosperity, inclusive development, and economic diversification. Traditionally a strong contributor to the state's agriculture Gross State Domestic Product (GSDP), the livestock sector plays a vital role in supporting the livelihoods of small and marginal farmers, particularly in rainfed and tribal regions where it acts as a buffer against agricultural risks and income volatility.

Dairying stands out as the most dominant component of the sector, with Andhra Pradesh being among India's top milk-producing states. This success is underpinned by an extensive network of dairy cooperatives, private dairy enterprises, and active women's self-help groups (SHGs). Under the new government, dairying is set to be scaled further through enhanced value-addition, decentralized cold chain infrastructure, and rural-based processing units. Strategic partnerships—such as those with Amul—are being deepened to promote high-quality milk procurement, skill training, and enterprise creation. With focused interventions, dairying can evolve into a high-impact rural enterprise aligned with the broader smart village and inclusive livelihood agendas.

Poultry is another high-performing segment, with Andhra Pradesh ranking among the top states in egg and broiler production. The state already plays a pivotal role in India's poultry exports and is well-supported by a strong feed manufacturing ecosystem. Going forward, the government aims to enhance disease surveillance, expand integrator models, and support exports through poultry clusters. Simultaneously, backyard poultry models for rural women and SC/ST households are being promoted to improve household nutrition and enable low-investment, high-return enterprises.

Small ruminants, particularly goats and sheep, are a critical source of livelihood for landless and marginal farmers, especially in the dry zones of Rayalaseema. These animals generate regular income through meat sales, but productivity is constrained due to limited access to veterinary care and quality breeding. Similarly, piggery, although less prominent, is practiced by tribal communities and offers significant potential for income and nutritional security. The current government is prioritizing breed improvement, mobile veterinary units, and tribal livelihood packages to mainstream these sub-sectors into the rural development agenda.

Livestock ownership in Andhra Pradesh cuts across caste and economic categories, with women, SHGs, Scheduled Castes (SC), Scheduled Tribes (ST), and landless families depending heavily on it. Women play a critical role in dairying, backyard poultry, fodder management, and animal health care, yet face barriers in accessing credit, training, and ownership rights. The new administration is integrating gender-sensitive strategies to empower women livestock farmers through SHG-based enterprises, targeted skilling, and easier access to inputs and markets.

Veterinary infrastructure in the state is being modernized through the expansion of Integrated Livestock Development Centres (ILDCs), mobile clinics, and e-veterinary services. Institutions such as the Andhra Pradesh Livestock Development Agency (APLDA), NDDB, NABARD, and SHG federations are being brought under a unified digital livestock governance platform to ensure convergence, transparency, and faster service delivery.

Despite its strengths, the sector continues to face challenges such as feed and fodder shortages, inadequate veterinary services in remote areas, lack of organized markets for small ruminants and backyard poultry, low access to livestock insurance, and vulnerability to disease outbreaks and climate stress. To address these issues, the government is investing in fodder banks, silage cooperatives, digital extension services, and One Health-based disease management systems.

A key thrust of the new vision is promoting youth and SHG-led entrepreneurship in dairy processing, poultry breeding, organic manure, and fodder production. Startups and FPOs in the livestock value chain are being supported through incubation centres, low-interest finance, and digital advisory services. Technology is being mainstreamed through AI-based breeding records, traceability tools, and smart devices for animal care.

On the market front, reforms are underway to formalize livestock mandis, aggregate producers into FPOs and SHGs, and build export-oriented clusters for dairy, poultry, and processed meat products. The focus is on creating a globally competitive livestock sector that delivers premium products with quality assurance and traceability.

Finally, climate resilience and sustainability are being embedded into livestock policies. Measures such as climate-resilient breeds, heat stress shelters, green fodder cultivation on degraded lands, and livestock waste recycling (biogas, vermicompost) are being promoted through a circular economy approach. These initiatives are tied to broader ecological goals, ensuring that livestock growth is both inclusive and sustainable.

Andhra Pradesh, under the leadership of Chandrababu Naidu, is strategically repositioning its livestock sector as a driver of rural transformation. With a forward-looking, tech-enabled, and enterprise-driven approach, the sector is set to evolve into a globally competitive, climate-resilient, and socially inclusive engine of growth for the state's Vision 2049.

BASELINE

The ***rapid baseline survey covering 101,657 livestock farmers across Andhra Pradesh*** was undertaken to generate actionable insights for enhancing livestock-based livelihoods, particularly in the context of rural poverty reduction and SHG-led enterprise development. The primary objective was to assess the current landscape of livestock farming practices and identify critical enablers and constraints to income enhancement.

The livestock sector in Andhra Pradesh is not just an industry; it is the heartbeat of rural livelihoods and a significant driver of economic development. The state boasts an impressive array of livestock, making it a frontrunner in the production of poultry, dairy, and meat, which together contribute substantially to the nation's overall agricultural output. With its rich biodiversity, the region is home to prized breeds such as the globally acclaimed Ongole cattle and the resilient Aseel poultry. This vibrant sector has evolved traditional animal husbandry into a dynamic industry that not only creates employment opportunities but also plays a pivotal role in alleviating poverty. Small and marginal farmers, women, and landless laborers are among the principal beneficiaries of this transformation.

To fully leverage the potential of livestock farming for sustainable development, the Department of Animal Husbandry has launched an ambitious rapid survey aimed at understanding the entrepreneurial spirit and growth potential inherent within the sector. This comprehensive initiative seeks to engage with an unprecedented one lakh farmers across various categories, thereby gaining deep insights into their unique challenges, opportunities, and aspirations.

RATIONALE FOR THE SURVEY

The impetus behind this extensive survey stems from the necessity to address existing knowledge gaps and to tailor targeted interventions. While the livestock sector has made substantial progress, numerous challenges continue to hinder its growth, including limited market access, inadequate veterinary services, and the pressing need for skill development and capacity building.

By reaching out to one lakh farmers, the survey intends to record a wide array of experiences and perspectives, equipping policymakers with the evidence needed to formulate strategies that foster entrepreneurship and promote sustainable practices within the sector.

OBJECTIVES

This rapid survey is constructed around several core objectives:

i. Identify Entrepreneurial Potential: Evaluate the entrepreneurial capacity among livestock farmers and their willingness to embrace innovative practices that could enhance productivity.

ii. Understand Challenges: Compile a comprehensive list of the key obstacles faced by farmers, which may include financial constraints, infrastructural inadequacies, and technical hurdles.

iii. Evaluate Sustainability Practices: Investigate the adoption of sustainable farming practices and measure their effects on productivity and overall profitability.

iv. Inform Policy and Programs: Generate actionable insights that can be leveraged to refine policy frameworks and enhance development programs tailored to the needs of the livestock sector.

METHODOLOGY:

The survey employed a quantitative data collection methodology to gather measurable insights from a diverse group of livestock farmers in Andhra Pradesh. Structured interviews ensured consistency in responses, covering areas like income, investment, access to finance, technology adoption, market linkages, and fodder management. This approach helped identify trends and gaps crucial for evidence-based policy formulation.

The Department of Animal Husbandry coordinated the data collection, engaging over 101,657 farmers from both Self-Help Groups (SHGs) and non-SHGs. Its expertise and decentralized outreach enabled comprehensive data collection across various regions and socioeconomic groups.

This methodology enhanced data reliability and representativeness while aligning with state priorities for livestock sector transformation under the Andhra Pradesh Vision 2049 framework, highlighting the importance of institutional partnerships in effective policy research.

This inclusive approach ensures a holistic understanding of the livestock sector in Andhra Pradesh, encompassing farmers with varied resources and practices. Key categories covered are:

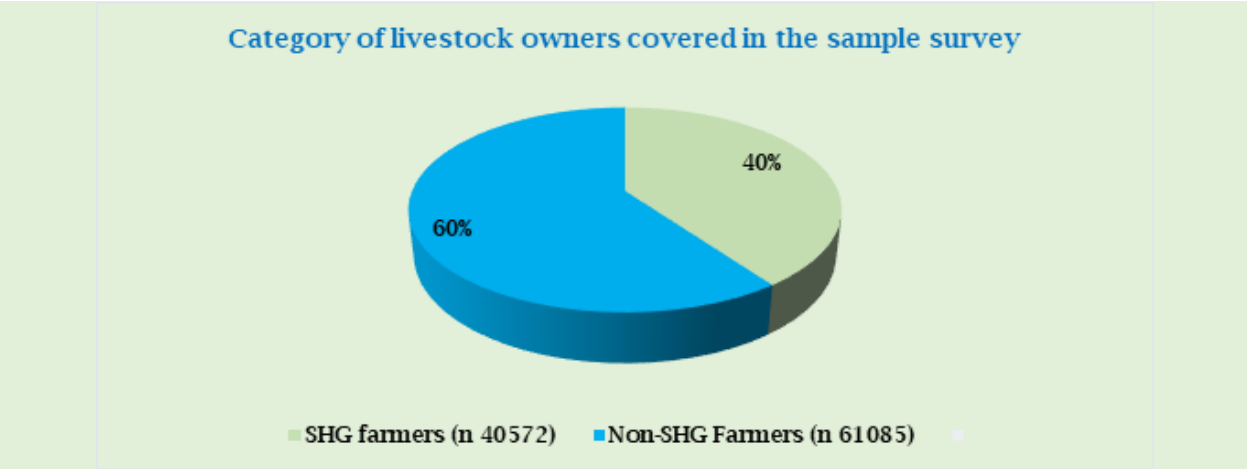
- **Milch Cow and Buffalo Farmers:** *These farmers raise cows and buffaloes for milk, making them key players in the state's dairy industry. Their work supports both rural nutrition and income. The survey looks at how to improve their milk production and tackle issues like fodder shortages and lack of veterinary care.*
- **Goat and Sheep Farmers:** *Farmers who raise goats and sheep help provide meat and extra income, especially in dry and hilly areas. Their traditional, low-cost methods are flexible but often hit by climate problems and limited grazing land. The survey explores ways to make their farming more secure and sustainable.*
- **Pig Farmers:** *Pig farming is a small but growing source of income for landless and poor farmers. This survey covers the problems they face, like poor access to markets, lack of good breeds, and waste management, to find ways to support their livelihoods better.*
- **Backyard Poultry Farmers:** *These farmers keep a few chickens at home, often local breeds, for eggs, meat, and family nutrition. It's a common, low-cost activity. The survey studies their challenges, such as disease control, and looks at how their small businesses can be improved or scaled up.*

By incorporating these diverse livestock categories, the survey aims to provide nuanced insights into the entrepreneurial spirit and sustainability within the sector. This comprehensive scope ensures that policy recommendations and developmental initiatives are tailored to the unique needs of each farmer category.

By meticulously mapping the entrepreneurial spirit and assessing the sustainable growth potential within this sector, this survey aspires to create a robust foundation for transformative interventions aimed at revitalizing and strengthening the livestock industry in Andhra Pradesh.

SCOPE AND COVERAGE:

The survey has been designed to include a diverse range of farmers, both those organized into Self-Help Groups (SHGs) and those operating independently (Non-SHGs).

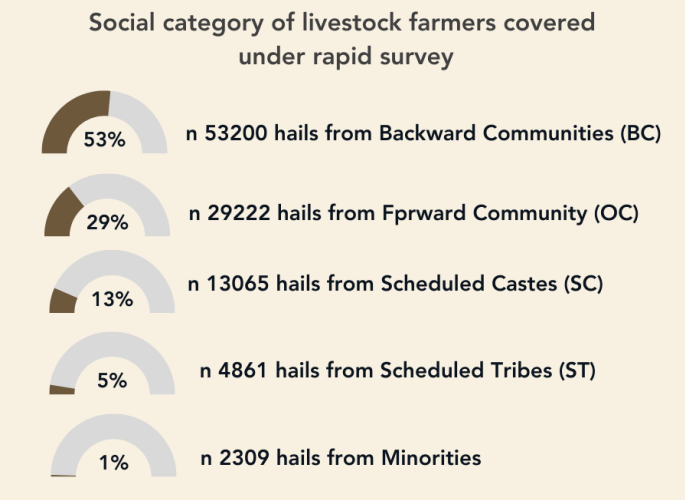


A comprehensive survey involving 101,657 livestock farmers in Andhra Pradesh indicates that ***40% (40,572) of the respondents are affiliated with Self-Help Groups (SHGs), while the remaining 60% (61,085) consist of non-SHG farmers.*** This distribution underscores the significant role that SHGs play in organizing and supporting a considerable segment of livestock farmers, particularly in areas such as access to credit, collective marketing, and training initiatives.

However, it is important to note the substantial gap that exists, as a majority of farmers operate outside this institutional framework. Consequently, there is a necessary call for a dual policy approach:

> ***Strengthening and expanding SHG-based livestock interventions while also extending institutional support mechanisms to the larger base of non-SHG farmers. This strategy aims to promote inclusive growth and facilitate enterprise development within the livestock sector.***

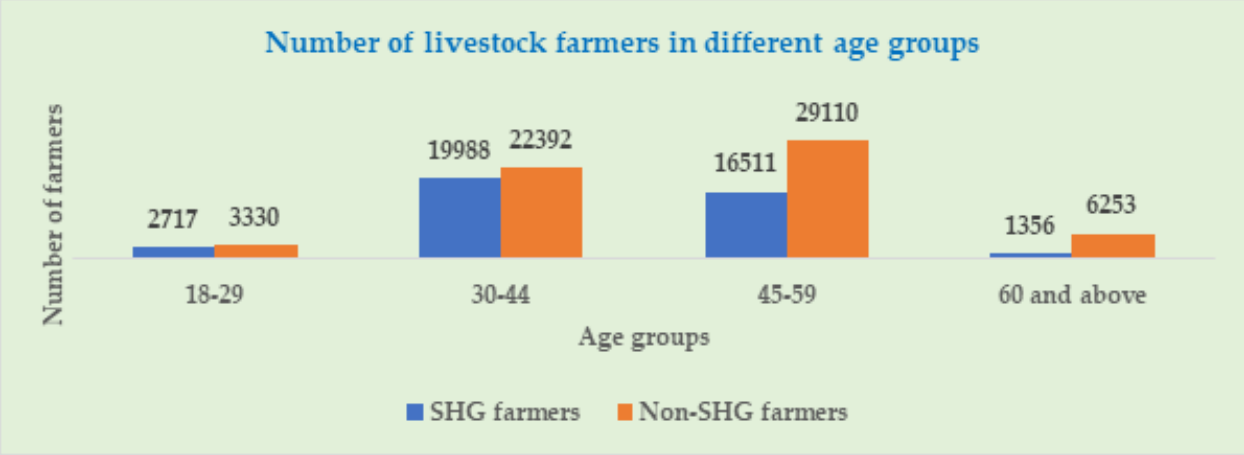
A rapid survey conducted among livestock farmers indicates a pronounced social distribution within the population, revealing that a substantial majority—53% respondents—identify as belonging to Backward Communities (BC). This finding emphasizes the critical role of livestock farming in sustaining the livelihoods of BC populations, highlighting the necessity for ongoing and targeted policy support for this demographic.



Forward Communities (OC) represent 29% of the surveyed population, totaling 29,222 individuals, which illustrates notable engagement even among comparatively advantaged social groups. Scheduled Castes (SC) account for 13% of the respondents (13,065 individuals), which reflects their moderate involvement in livestock-related occupations, likely constrained by factors such as limited land ownership and access to financial resources.

Scheduled Tribes (ST) constitute only 5% of the sample (4,861 individuals), suggesting potential geographical or systemic exclusions that warrant targeted interventions for tribal communities. Furthermore, minority communities represent a mere 1% (2,309 individuals), raising significant concerns regarding their access to and participation in livestock farming. In summary, the data elucidates the socially stratified nature of livestock-based livelihoods in the region and underscores the imperative for inclusive, equity-oriented policy measures to ensure balanced development across all social strata.

The age-wise distribution of livestock farmers highlights that the majority of both SHG and non-SHG farmers fall within the 30–59 age group, indicating that livestock farming is primarily driven by individuals in their prime working years. Among them, the 45–59 age bracket holds the highest number of participants, especially among non-SHG farmers (29,110), compared to 16,511 SHG farmers. This suggests a greater engagement of middle-aged, possibly more experienced farmers in non-SHG setups.

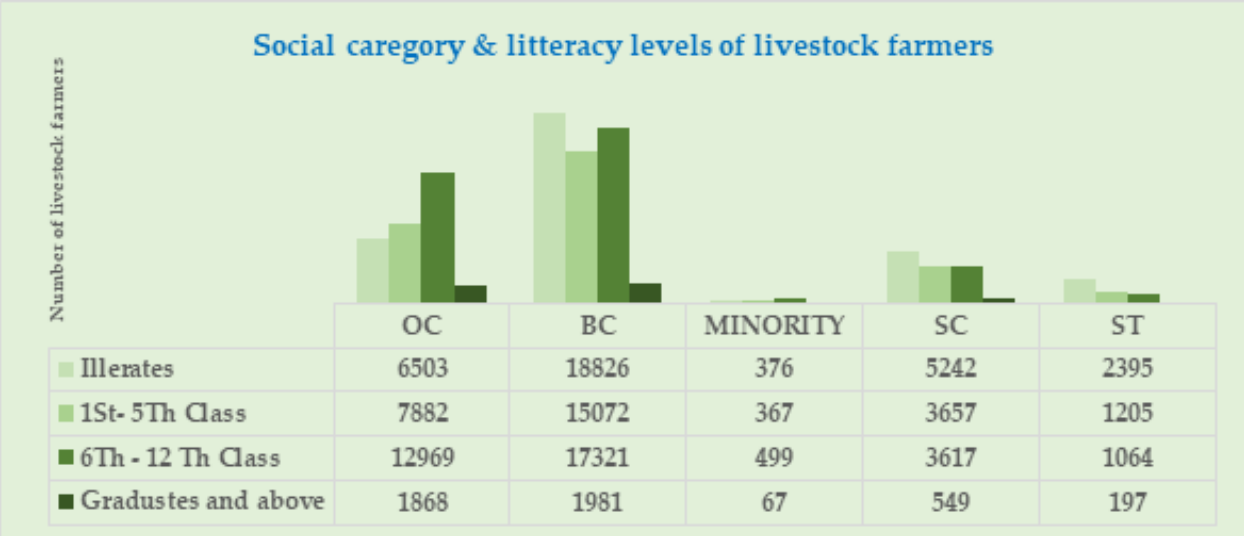


The 30–44 age group also shows strong participation, with relatively balanced numbers between SHG (19,988) and non-SHG (22,392) farmers. This reflects the receptiveness of this age group to both collective and independent farming models, and possibly their adaptability to newer interventions or programs.

Participation among younger farmers (18–29) is notably low in both groups, but even more so among SHG members. This signals a generational gap in livestock farming and points to the urgent need for youth-focused strategies to rejuvenate the sector. Low youth participation may be attributed to migration, lack of interest in traditional agriculture, or inadequate incentives for livestock-based livelihoods.

Meanwhile, farmers aged 60 and above show minimal engagement in SHGs (1,356), though some continue independently (6,253 non-SHG). This further reinforces the perception that SHGs are more attractive to working-age adults than to elderly farmers.

Overall, the data suggests that livestock-related SHG programs are best positioned to target farmers aged 30–44 for scaling impact, while special efforts are needed to engage youth through skilling, innovation, and entrepreneurship models to ensure generational continuity in livestock farming.



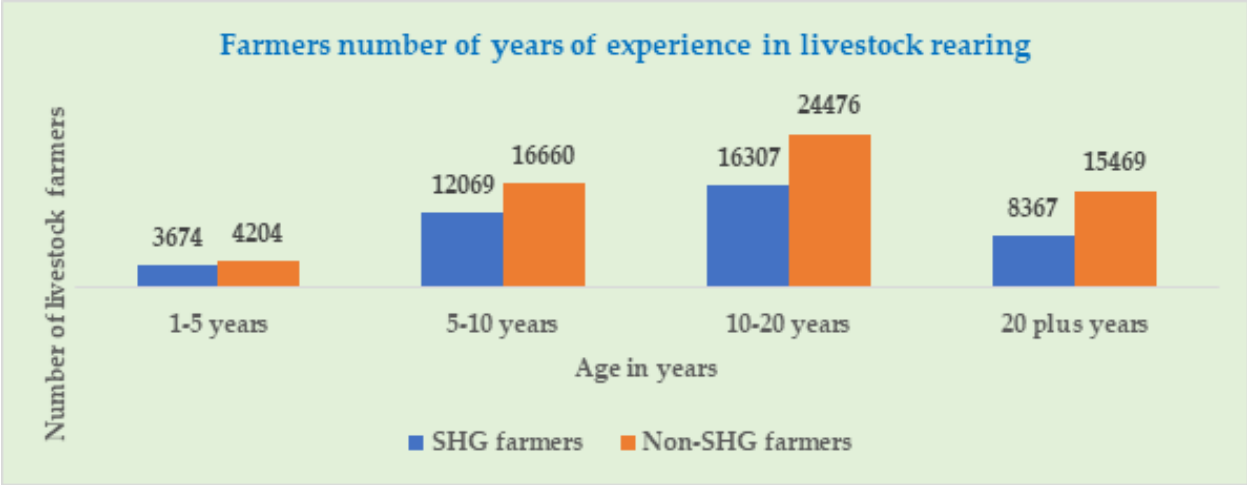
	OC	BC	MINORITY	SC	ST
Illerates	6503	18826	376	5242	2395
1St- 5Th Class	7882	15072	367	3657	1205
6Th - 12 Th Class	12969	17321	499	3617	1064
Gradustes and above	1868	1981	67	549	197

The analysis of livestock farmers' years of experience reveals a consistent trend: non-SHG farmers outnumber SHG-affiliated farmers across all experience levels. This gap is particularly wide among farmers with 10–20 years and over 20 years of experience, suggesting that more seasoned livestock farmers are less likely to be associated with SHGs. In contrast, SHG participation is relatively stronger among newer farmers, particularly those with 1–10 years of experience, indicating that SHGs are more effective in engaging recent entrants to livestock farming.

The bar chart illustrates the distribution of livestock farmers across different social categories and social classes. The Backward Classes (BC) have the highest number of farmers overall, with the Illerates making up the largest portion followed by those in the 1st-5th Class, 6th-12th Class, and Graduates and above. In the OC (Open Category), the number of illiterate farmers is also the highest, but the numbers decline noticeably as education levels increase.

The Minority category has comparatively fewer farmers, with the majority being illiterate and decreasing numbers in higher educational groups. For the Scheduled Castes (SC), a similar pattern emerges, with the highest number of farmers among Illiterates and decreasing figures in more educated groups. The Scheduled Tribes (ST) have the lowest overall numbers, particularly among graduates and above.

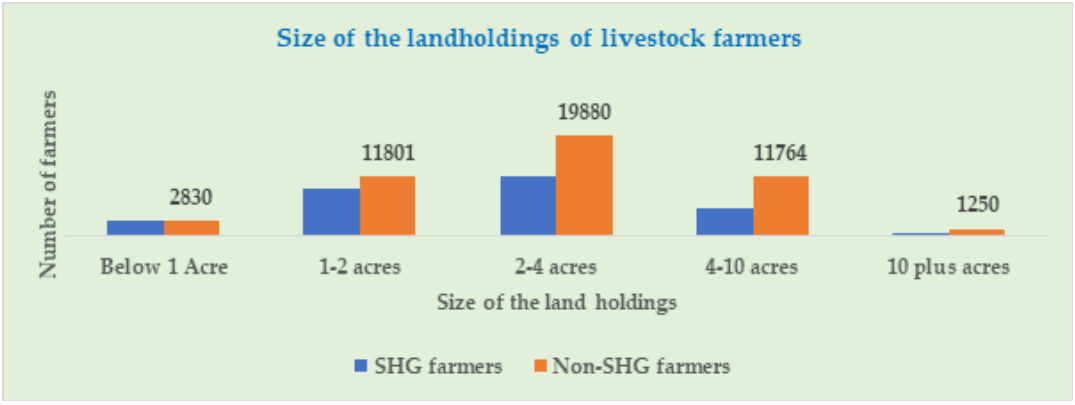
Overall, the data suggests that illiteracy is prevalent among livestock farmers in all social categories, especially within BC and SC groups, and the total number of farmers tends to decline as education levels increase across all categories.



Both SHG and non-SHG farmer participation peaks in the 10–20 years' experience category, highlighting this group as the most operationally active and potentially the most responsive to productivity-enhancing interventions. However, SHG engagement sharply declines in the 20+ years category, pointing to a potential disconnect between long-established farmers and collective models like SHGs. This may reflect generational preferences, lower perceived value of SHG benefits for mature enterprises, or limited SHG outreach to older cohorts.

Overall, these patterns suggest that SHGs are playing a vital role in early-stage farmer support but have scope to expand their influence among more experienced livestock producers. Tailored strategies are needed to deepen SHG penetration among all experience levels, including mentorship models, targeted training, and incentives for long-term adoption.

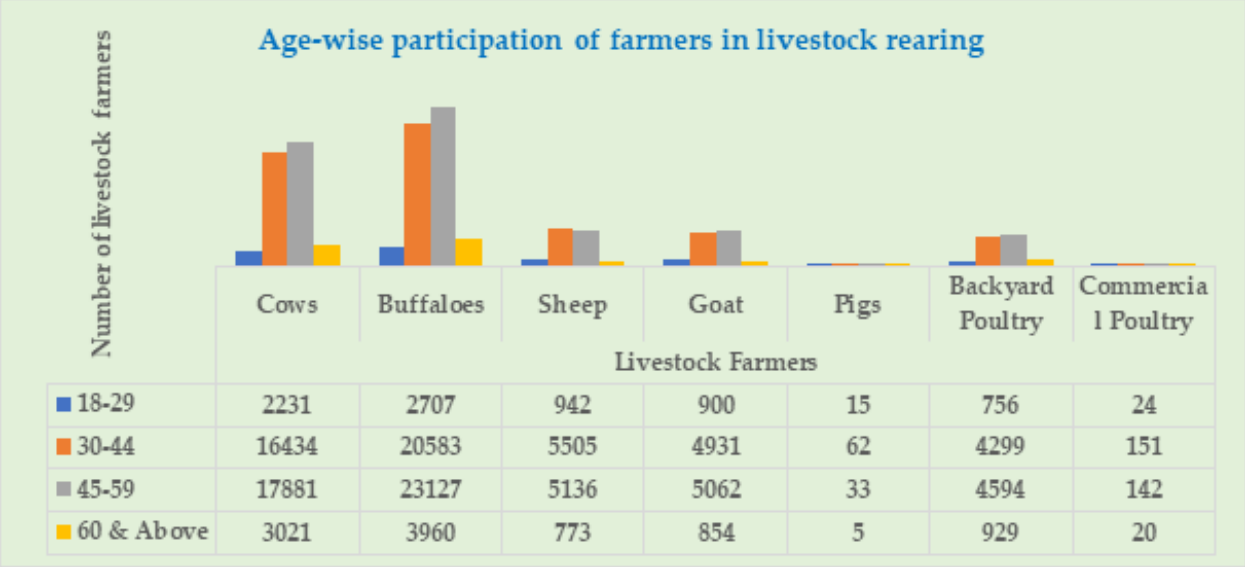
The distribution of livestock farmers by landholding size reveals that SHG (Self-Help Group) membership is predominantly concentrated among small and marginal farmers, especially those owning less than 4 acres. SHG farmers are most numerous in the 2–4 acre category (11,751), followed by 1–2 acres (9,178) and even below 1 acre (2,763). This underscores the strong alignment of SHGs with the needs of resource-poor farmers, offering them collective strength to overcome limitations in access to finance, inputs, and markets.



In contrast, non-SHG farmers dominate the larger landholding categories, particularly in the 2–4 acre (19,880), 4–10 acre (11,764), and 10+ acre (1,250) brackets. The 2–4 acre segment shows the most significant difference, with non-SHG farmers nearly doubling the SHG count. This suggests that as landholding size increases, farmers may be more inclined to operate independently or through market-led arrangements rather than SHGs.

Notably, SHG participation is minimal among large landowners with over 10 acres, where only 395 SHG farmers are recorded. This trend implies that wealthier and more established farmers may not perceive SHG membership as beneficial or necessary for their operations.

Overall, the data highlights that ***SHGs are playing a crucial role in empowering smallholders and should be the primary channel for interventions aimed at the most vulnerable segments.*** Meanwhile, differentiated models like cooperatives, farmer-producer organizations (FPOs), or public-private partnerships may be more effective for engaging larger farmers in livestock development programs.



	Cows	Buffaloes	Sheep	Goat	Pigs	Backyard Poultry	Commercial Poultry
	Livestock Farmers						
18-29	2231	2707	942	900	15	756	24
30-44	16434	20583	5505	4931	62	4299	151
45-59	17881	23127	5136	5062	33	4594	142
60 & Above	3021	3960	773	854	5	929	20

The table depicting the age-wise distribution of livestock farmers across various livestock categories offers a revealing picture of generational engagement in animal husbandry. The data illustrates that the sector is primarily dominated by middle-aged farmers, with younger and older age groups showing markedly lower participation.

The most prominent finding is the overwhelming dominance of livestock ownership among individuals aged 30–44 and 45–59. These two age groups together form the core workforce in the sector, contributing the highest numbers across nearly all livestock categories. For instance, buffalo rearing is most prevalent in the 45–59 age group (23,127) followed closely by the 30–44 bracket (20,583). Similarly, cow ownership also peaks in these same cohorts (17,881 and 16,434 respectively). These middle-aged farmers also maintain strong presence in rearing small ruminants like sheep and goats, and manage backyard poultry and commercial poultry in comparatively larger numbers.

This pattern suggests that individuals in this age band possess the combination of physical vigor, agricultural experience, and financial stability needed to manage livestock operations effectively. Their active engagement indicates that policy support aimed at this demographic—such as access to working capital, training in modern technologies, and inclusion in formal markets—can yield strong returns for rural development and productivity enhancement.

In contrast, the youth segment (18–29 years) displays significantly lower involvement across all livestock categories. This group accounts for only 2,231 cow farmers, 2,707 buffalo owners, and negligible participation in piggery (15) and commercial poultry (24). These figures reflect several barriers young people face, including limited access to land, capital, and credit, as well as a lack of motivation or aspiration to take up livestock rearing as a viable livelihood. It is also likely that traditional livestock-based livelihoods are perceived as low-profit or high-effort compared to urban jobs or non-farm enterprises.

This is a critical concern, as the future sustainability of the livestock sector depends on the inflow of younger generations. Hence, incentivizing youth through technology-enabled enterprises, incubators, livestock-based start-ups, and digital platforms could be transformative.

> ***Programs targeting entrepreneurial models and market-linked services can rekindle interest among the youth and ensure the continuity of the sector.***

At the other end of the spectrum, the elderly population (60 years and above) shows minimal engagement in livestock activities. For instance, only 3,021 farmers aged 60+ are involved in cow rearing, with even lower participation in more intensive activities like commercial poultry (20) and piggery (5). This limited involvement is understandable given the physical demands of livestock rearing and suggests that retirement from active farming without effective succession planning may lead to the gradual erosion of traditional livestock knowledge and family-based farm systems. It underscores the need for structured intergenerational transfer mechanisms, such as family farming support schemes, knowledge-sharing platforms, and collaborative livestock enterprises involving both older and younger family members.

In conclusion, this age-disaggregated data reveals a clear generational imbalance in livestock farming. The dominance of middle-aged farmers signals both an opportunity and a vulnerability. Their current commitment can be harnessed through targeted support, but the ***lack of youth engagement poses long-term sustainability risks.*** Ensuring the future vitality of the livestock sector will require ***dedicated youth engagement strategies, support for mid-career farmers, and transitional planning for elderly farmers.*** Policy interventions must thus adopt a **life-cycle approach**, addressing the unique needs, barriers, and motivations of each age cohort to build a resilient and inclusive livestock economy.

2

LIVESTOCK MANAGEMENT AND SPECIES DISTRIBUTION

Mapping the backbone of rural animal husbandry

Livestock plays a pivotal role in sustaining rural livelihoods, enhancing food security, and contributing to agricultural income in Andhra Pradesh. Understanding how livestock is managed and how species are distributed across regions is essential for designing targeted interventions and support systems. This section provides an overview of livestock ownership patterns, species composition, and management practices adopted by farmers. By mapping these dynamics, we can identify key trends, regional strengths, and potential areas for improvement in animal husbandry, ensuring that policies and programs are responsive to the needs of rural communities.

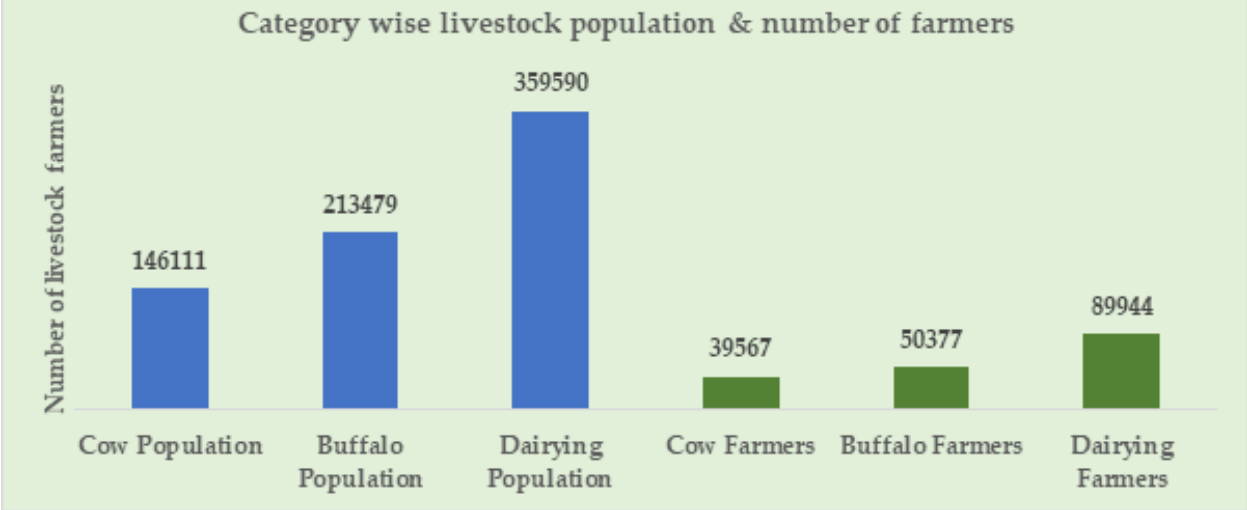
KEY FINDINGS

The livestock sector in Andhra Pradesh is predominantly smallholder-driven, with buffaloes (2.13 lakh) outnumbering cows (1.46 lakh), reflecting a preference for buffaloes due to higher milk fat content and adaptability.

Of the 89,944 dairying farmers, many rear both cows and buffaloes, averaging around four animals per household. The small-scale nature of operations limits economies of scale but presents opportunities for targeted interventions like SHG-led models, community vet services, and affordable technology.

Policy and breed strategies must address the needs of both cows and buffaloes to ensure inclusive dairy development.

CATEGORY WISE LIVESTOCK POPULATION & FARMERS



The bar chart depicting the category-wise livestock population and number of farmers provides valuable insights into the structure and dynamics of dairying in Andhra Pradesh. It shows that buffaloes (2,13,479) outnumber cows (1,46,111), indicating a regional preference for buffaloes, likely due to their higher milk fat content and adaptability to local conditions. When combined, the total bovine (cow + buffalo) population engaged in dairying stands at 3,59,590.

Interestingly, while the number of cow farmers is 39,567 and buffalo farmers is 50,377, the total number of dairying farmers is 89,944, suggesting that many farmers rear both species. This mixed rearing strategy can be seen as a risk-hedging mechanism and a means to stabilize milk output throughout the year, as cows and buffaloes have different lactation patterns.

On average, each cow farmer owns around 3.7 cows, and each buffalo farmer owns approximately 4.2 buffaloes, with the overall average across dairying farmers being roughly 4 animals per household. This clearly characterizes dairying in the region as a smallholder-driven enterprise, with limited economies of scale. Such herd sizes imply high reliance on family labour, restricted capacity to invest in modern technology, and increased vulnerability to input cost shocks.

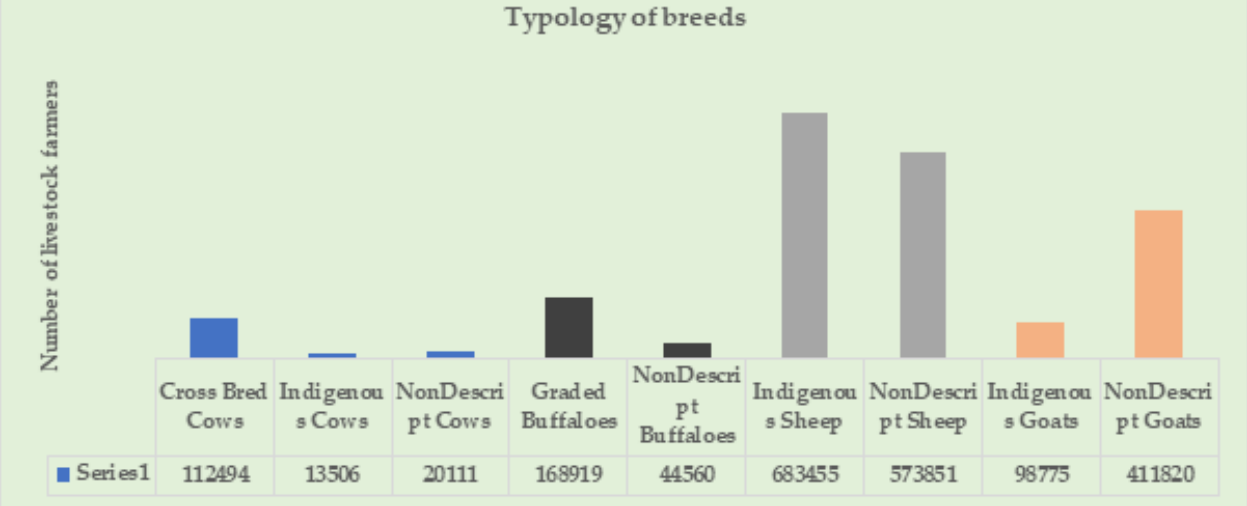
The small-scale nature of operations poses challenges such as limited access to veterinary care, credit, and markets. However, it also offers opportunities for targeted interventions. For instance, smallholder-focused technologies (like low-cost milking machines), group-based procurement (via SHGs or cooperatives), and community veterinary support models can significantly enhance productivity and profitability.

Moreover, given the higher number of buffalo farmers and the dominance of buffaloes in the herd structure, breed improvement programs, extension services, and fodder strategies must be tailored to both cows and buffaloes rather than a one-size-fits-all approach.

This data highlights the predominance of smallholder mixed dairying, the regional preference for buffaloes, and the need for cluster-based service delivery, women-centric SHG-led models, and affordable technology adoption to sustainably transform the dairy economy of Andhra Pradesh.

TYPOLOGY OF BREEDS

The data on the typology of livestock breeds in Andhra Pradesh reveals a stark contrast between species in terms of breed improvement and genetic advancement. Among cows, crossbred varieties (1,12,494) outnumber both indigenous cows (13,506) and nondescript cows (20,111), indicating a moderate penetration of crossbreeding initiatives—likely driven by government-led artificial insemination programs aimed at boosting milk productivity. This suggests that dairy development schemes have had some success, though the low number of indigenous cows points to a need for targeted conservation programs to preserve hardy, disease-resistant native breeds.



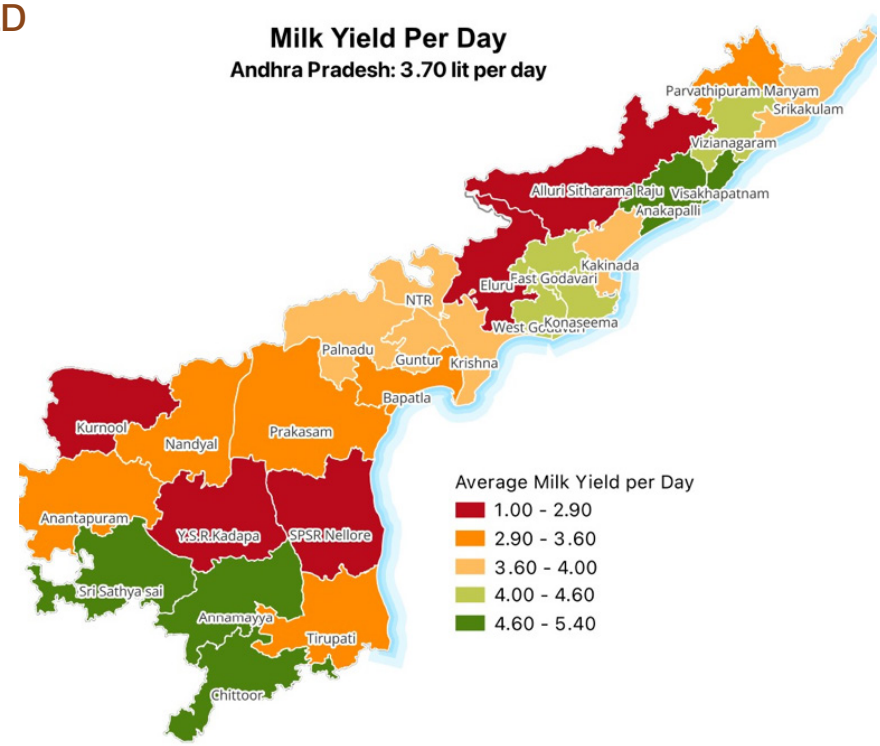
In buffaloes, the majority belong to the graded category (1,68,919), with only 44,560 classified as nondescript. This pattern reflects relatively successful adoption of breed improvement practices among buffalo rearers, possibly due to their focus on high-value milk production with better fat content. The relatively small number of nondescript buffaloes compared to cattle implies better breed management in this segment.

However, the picture changes dramatically when looking at small ruminants. Sheep populations are split between indigenous breeds (6,83,455) and nondescript types (5,73,851), indicating that while traditional breed identities persist, a significant proportion of the population remains genetically undifferentiated. This reveals a pressing opportunity to scale up structured breeding programs to improve meat yield, disease resistance, and wool quality, especially among community or pastoral herders.

The situation is most concerning in goats, where nondescript breeds (4,11,820) vastly outnumber indigenous ones (9,875). This dominance of genetically undefined stock suggests that goat rearing remains largely informal, with minimal breed-specific management or genetic enhancement. Since goats are primarily reared by landless or marginal farmers in extensive systems, this calls for the introduction of low-cost, community-based breed improvement and conservation strategies to boost productivity and resilience.

In summary, ***while dairy cattle and buffaloes have benefitted from systematic breed improvement efforts, the vast populations of nondescript sheep and goats signal an urgent need for inclusive genetic upgrading programs. Strengthening indigenous breed development alongside productivity improvements, especially for small ruminants, will be essential to enhance incomes and sustainability for smallholder and marginal livestock farmers across the state.***

MILK YIELD



The map depicts the average milk yield per day across various regions in Andhra Pradesh, highlighting significant differences in milk production levels throughout the state. The regions with the lowest milk yields, ranging from 1.00 to 2.90 liters per day, are primarily situated in the northern and northeastern parts of Andhra Pradesh, such as Kurnool, Alluri Sitarama Raju, and Srikakulam. These areas are represented in dark red, indicating relatively lower productivity in dairy farming.

Moving towards the central and southern parts of the state, the milk yield generally increases to a moderate level, between 2.90 and 3.60 liters per day. These regions are shown in orange, including districts like Nandyal, Guntur, and Chittoor. This suggests that dairy farming in these areas is somewhat more productive, but still not at the highest levels.

The regions with higher milk yields, ranging from 3.60 to 4.00 liters per day, are represented in light yellow. Districts such as Palnadu and Krishna fall into this category, indicating a better level of dairy productivity. The highest milk yield levels, between 4.00 and 5.40 liters per day, are concentrated in the southern and southwestern parts of Andhra Pradesh, such as Anantapur and Sri Sathya Sai. These areas are marked in green, signifying a relatively high level of milk production.

Overall, the map reveals a clear spatial pattern where northern and northeastern regions tend to have lower milk yields, while southern and southwestern districts tend to produce more milk per day. This variation could be influenced by factors such as climate, breed of cattle, availability of feed, and economic practices. Understanding these differences is crucial for planning targeted interventions to improve dairy productivity across the state.

3 ECONOMIC PROFILE AND INCOME STREAMS

Income, Expenditure, and Financial Realities on the Ground

This chapter discusses the financial aspects of livestock farming, focusing on investments, income, and their effects on rural livelihoods. Key areas include monthly costs for fodder, veterinary care, labor, and equipment, alongside income sources from dairy, small ruminants, poultry, and pigs. It evaluates market access through various selling channels and identifies profitable sectors needing support. Investment sources like personal savings, bank loans, SHG credit, microfinance, and government subsidies are examined, including the utility of the Pashu Kisan Credit Card and livestock insurance as risk management tools. Overall, the findings aim to guide financial institutions and policymakers in offering tailored support for livestock farmers in Andhra Pradesh.

KEY FINDINGS

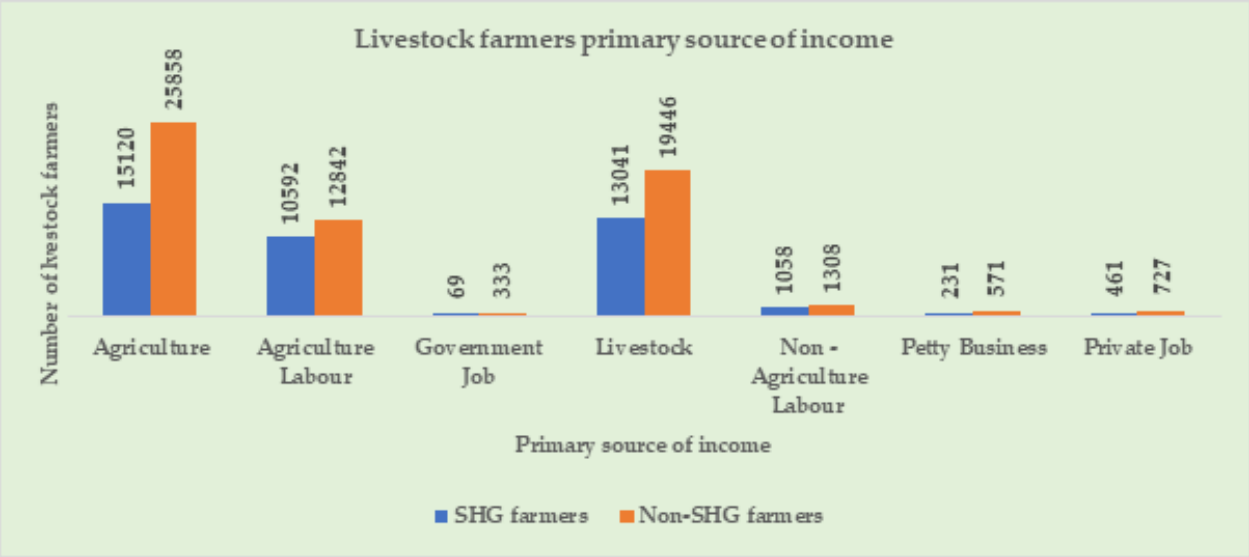
The income analysis of livestock farmers in Andhra Pradesh shows that agriculture and livestock are primary income sources, especially for SHG members with limited land ownership. The average annual income is Rs.2 lakh, with wealthier districts like Guntur and Krishna earning significantly more than poorer districts such as Srikakulam.

Investment is closely tied to income, with middle-income farmers reinvesting in their operations, while lower-income groups face financial constraints. Most investments are self-funded, and the income-to-investment ratio varies across districts.

Small ruminants are the most viable livestock option in rainfed areas, with dairy being effective where infrastructure exists, and backyard poultry being moderately feasible for women. Piggery has potential but faces adoption issues, while commercial poultry is less viable for smallholders. Targeted strategies are needed to enhance livestock performance in underperforming areas.

LIVESTOCK FARMERS PRIMARY SOURCE OF INCOME

The distribution of primary sources of income among livestock farmers reveals that agriculture and livestock are the two dominant livelihood streams for both SHG and non-SHG members. Notably, a significantly higher number of non-SHG farmers (25,858) rely on agriculture as their primary income compared to SHG farmers (15,120), suggesting that non-SHG members tend to be more agriculture-dependent and possibly have larger or more secure landholdings.



Livestock as a primary source of income is the second most prominent category, with 19,446 non-SHG farmers and 13,041 SHG farmers identifying it as their main livelihood. This indicates a strong engagement with animal husbandry across both groups, though SHG farmers may be more likely to combine livestock with other income-generating activities, given their typically smaller landholdings.

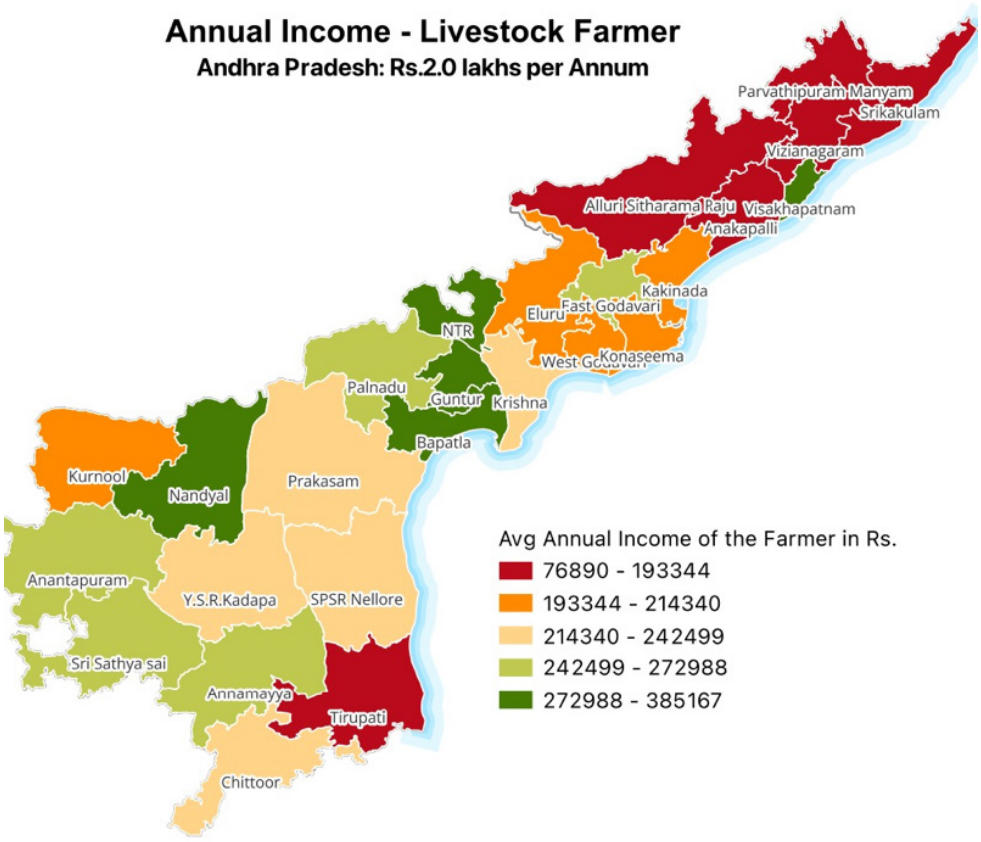
A significant portion of SHG farmers also cite agricultural labour (10,592) as their main income source, compared to 12,842 among non-SHGs. This suggests that SHG members are more likely to be wage labourers or landless farmers who supplement their income with livestock activities. Similarly, the presence of SHG farmers in non-agricultural labour and petty business categories, although smaller, reflects livelihood diversification among lower-income rural households.

The numbers in salaried employment categories (private and government jobs) are relatively low across both groups, underscoring the limited penetration of formal employment among rural livestock-rearing households.

Overall, the data underscores the ***critical role of livestock as a complementary or fallback income source, particularly for SHG farmers who often lack stable or sufficient earnings from primary agriculture. This highlights the need for policies that integrate livestock promotion with broader rural development strategies, targeting smallholders and agricultural labourers with support for productivity, value-addition, and market access.***

ANNUAL INCOME OF LIVESTOCK FARMERS

The map on Annual Income of Livestock Farmers in Andhra Pradesh highlights significant inter-district disparities in earnings, with the state-level average at Rs.2.0 lakhs per annum. This income variation reflects differences in scale of operations, market linkages, input costs, and access to services across regions.



Districts such as Guntur, Krishna, NTR, and Palnadu lead with the highest average annual incomes, ranging between Rs.2.73 to Rs.3.85 lakhs, suggesting well-developed livestock value chains, better access to markets, institutional support, and efficient farming practices. These districts can serve as models for replicating successful livestock interventions.

A second cluster including Anantapuram, Sri Sathya Sai, Chittoor, and Vizianagaram falls within the income band of Rs.2.42 to Rs.2.73 lakhs, indicating relatively strong performance, possibly driven by dairying and organized poultry enterprises.

The majority of the state, including SPSR Nellore, YSR Kadapa, Prakasam, Eluru, Kakinada, and West Godavari, falls into the middle income category (Rs.2.14 to Rs.2.42 lakhs). These districts represent an average performance level, showing moderate productivity with room for targeted policy and technological interventions to boost farmer incomes.

Worryingly, districts such as Tirupati, Srikakulam, Parvathipuram Manyam, and Alluri Sitharama Raju are in the lowest income band (Rs.76,890 to Rs.1.93 lakhs). These regions, often tribal or rainfed, face structural challenges including poor market connectivity, limited veterinary services, low productivity, and underdeveloped infrastructure. Focused interventions are urgently needed here, especially in breed improvement, healthcare access, feed supply, and credit linkages.

This income landscape underscores the need for region-specific strategies to promote inclusive livestock development. ***The policy must aim to uplift underperforming districts while consolidating gains in high-performing ones through innovation, entrepreneurship promotion, and institutional reforms.***

INVESTMENTS AND INCOME

		Avg Annual Income									
		1-50k	50k-1L	1L-3L	3L-5L	5L-10L	10L-50L	50L-1Cr	1Cr-3Cr	3Cr and Above	Grand Total
Avg Annual Investment	1-50k	7741	10653	13033	891	288	59				32665
	50k-1L	1351	3571	18466	1936	431	60				25815
	1L-3L	638	1993	16129	9186	3072	200				31218
	3L-5L	31	77	1140	884	2043	306				4481
	5L-10L	27	57	472	461	835	780				2632
	10L-50L	7	18	88	60	128	201	4			506
	50L-1Cr				2		2	3	1		8
	1Cr-3Cr				1	2	2	1	7	1	14
	3Cr and Above							2	1	2	5
	Grand Total	10131	16607	49630	13455	6811	1612	10	9	3	98268

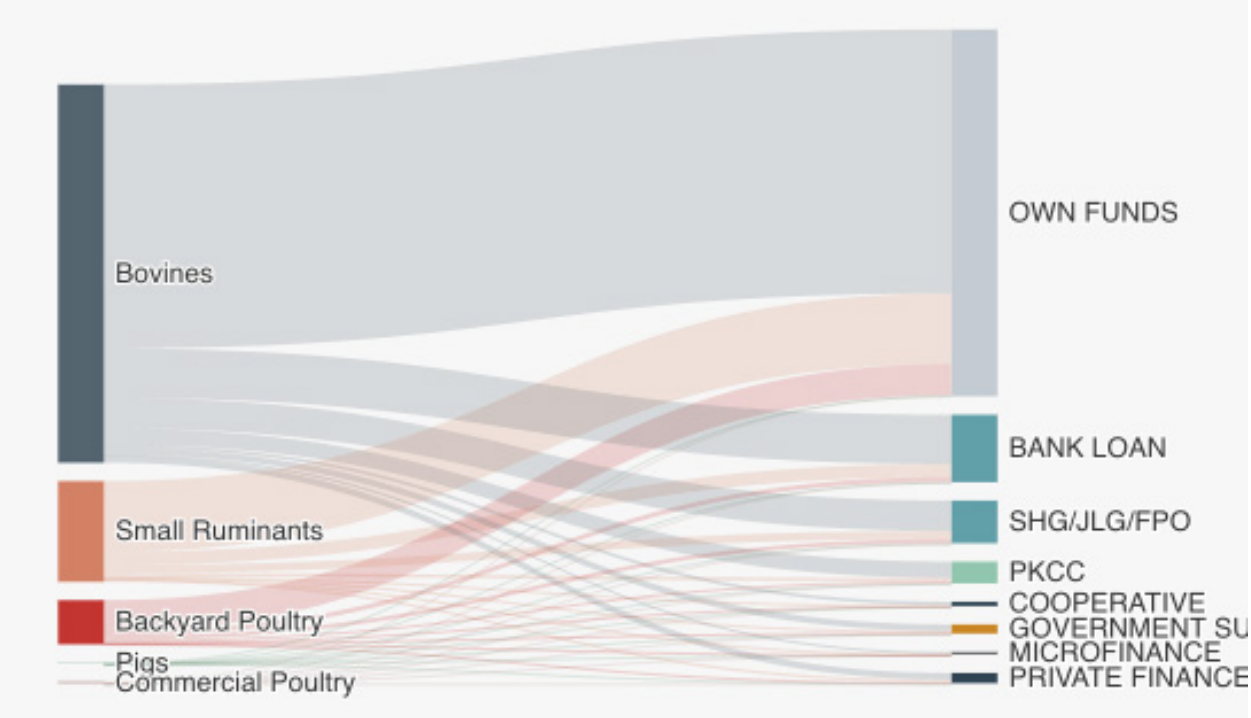
The cross-tabulation of average annual income and investment levels among livestock farmers provides valuable insights into their economic behavior and capacity to scale operations. The data shows a strong correlation between income and investment, with most farmers clustering within matching income-investment bands. The highest concentrations are found in the Rs.1–3 lakh income group, where the majority of farmers are also investing Rs.50,000 to Rs.1 lakh or Rs.1–3 lakh annually. This indicates that this middle-income group is both willing and able to reinvest significantly into livestock-based livelihoods, making them a critical segment for targeted policy support.

In contrast, the lower-income groups (Rs.1–50k and Rs.50k–1L) are concentrated in the lowest investment bands, reflecting constrained financial capacity. Most of these farmers invest less than Rs.1 lakh annually, likely due to limited access to formal credit and lower risk appetite. However, the substantial numbers in this segment (e.g., 7,741 farmers earning under Rs.50k also investing under Rs.50k) show latent demand, which can be unlocked through inclusive financing mechanisms and support systems like SHG linkages and subsidies.

At the upper end, high-income farmers (above Rs.10 lakh) are investing significantly larger amounts — sometimes Rs.5 lakh or more annually. Although their numbers are small, their presence in the Rs.10–50 lakh and above investment bands highlights the potential for developing commercial livestock enterprises and value chains if appropriately incentivized.

Overall, the data underscores the ***need for a tiered investment support strategy: (1) enabling access to credit and de-risking for lower-income farmers, (2) capacity building and working capital for the middle tier, and (3) enterprise development and formalization support for the high-investment segment.*** This differentiated approach can catalyze inclusive growth and modernization of the livestock sector.

CATEGORY WISE INVESTMENTS



The Sankey diagram vividly captures the distribution of financial flows from various investment sources into different livestock enterprises—namely small ruminants, bovines, backyard poultry, pigs, and commercial poultry. One of the most prominent takeaways from this visualization is the dominance of own funds as the primary means of investment across all livestock categories. This overwhelming reliance on self-financing reflects both a resilience and a constraint—on the one hand, it demonstrates the willingness of farmers to invest in their livelihoods using personal savings, but on the other, it highlights a significant gap in access to formal or institutional credit.

This trend suggests that many farmers—regardless of the type of enterprise—either lack access to institutional credit or choose to avoid it, possibly due to complex application processes, fear of indebtedness, inadequate awareness, or distrust of financial institutions. This pattern may also reflect systemic exclusion, especially of smallholders, women, and marginalized groups, from formal financial services.

Among institutional sources, bank loans emerge as the most prominent, with a relatively stronger presence in capital-intensive segments like bovines and commercial poultry, where the scale of operations typically necessitates larger investments. The moderate flows of bank loans into backyard poultry and small ruminants suggest some penetration in lower-scale or entry-level enterprises, but still fall short of what would be expected if credit systems were truly inclusive and robust.

SHG/JLG/FPO networks provide another noteworthy layer of support, particularly for backyard poultry and small ruminants—two segments commonly associated with women, landless, or small-scale farmers. This reflects the strategic value of community-based financing mechanisms, which offer more accessible, trust-based, and locally embedded forms of credit. It also reinforces the case for strengthening SHG ecosystems through capacity building, linkages with banks, and targeted support for livestock-based microenterprises.

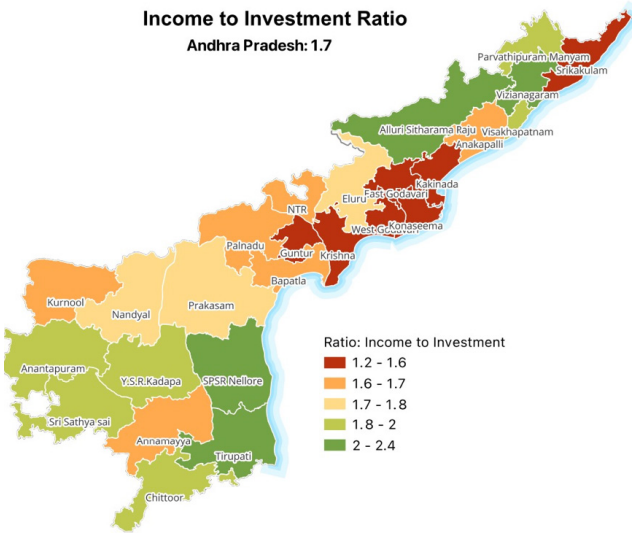
In contrast, government subsidies, PKCC (Pasu Kisan Credit Card), and cooperative credit institutions appear to have marginal reach. This limited flow suggests that despite the policy intent to promote livestock through these channels, ground-level uptake is weak, possibly due to procedural bottlenecks, poor last-mile delivery, eligibility mismatches, or lack of awareness. Notably, the Kisan Credit Card scheme, originally designed for crop agriculture, has seen only partial integration of livestock financing—a missed opportunity that merits urgent rectification.

Microfinance institutions and private finance show minimal engagement in the livestock sector, despite their theoretical potential to reach underserved populations. Their limited role might stem from a combination of high transaction costs, perceived risk, and regulatory constraints in financing animal husbandry ventures.

INCOME TO INVESTMENT RATIO

The Income to Investment Ratio map for Andhra Pradesh reveals significant regional disparities in the profitability of livestock-related activities across districts. The state-level average stands at 1.7, indicating that, on average, for every rupee invested in livestock, farmers earn Rs.1.70 in return. However, this return varies widely by region, pointing to differences in efficiency, input costs, productivity, and market access.

Districts such as Tirupati and SPSR Nellore emerge as top performers, with income-to-investment ratios in the range of 2.0 to 2.4, suggesting highly efficient livestock practices, possibly aided by better veterinary support, infrastructure, and market connectivity. Similarly, districts like Chittoor, Anantapuram, YSR Kadapa, and Vizianagaram fall in the 1.8 to 2.0 range, indicating moderately high returns on investment and a healthy livestock ecosystem.



In contrast, a large portion of the central and coastal Andhra region, including key districts such as Guntur, Krishna, NTR, East and West Godavari, Konaseema, and Kakinada, shows a low income-to-investment ratio between 1.2 and 1.6. This is concerning, especially given these districts are traditionally strong in dairy and poultry. The low returns may be attributed to high input costs, inadequate price realization, or market and infrastructure bottlenecks.

Districts like Palnadu, Bapatla, Prakasam, Nandyal, and Annamayya fall into the middle bracket of 1.6 to 1.8, suggesting average performance with scope for improvement through targeted policy and investment support.

This spatial analysis underscores the ***need for district-specific strategies to enhance profitability in the livestock sector. Regions with low returns require urgent attention in the form of input cost rationalization, market reforms, better insurance coverage, and access to institutional finance. High-performing regions offer models that can be replicated or adapted in lagging districts.*** This data-driven approach can guide effective prioritization of investments and innovation in the livestock economy.

FEASIBILITY RATING

Category	Feasibility Rating	Key Reason	Feasibility
Sheep & Goat	☆☆☆☆☆ (Very High)	Best return on investment	Suitable for small holders with moderate average holdings (73 animals)
Dairying	☆☆☆☆ (High)	High income despite high cost	ideal for farmers with lower herd sizes but reliable market access.
Backyard Poultry	☆☆☆ (Moderate)	Low-cost, scalable, SHG-friendly	Ideal for SHGs and marginal farmers, though absolute returns per animal are modest.
Piggery	☆☆ (Moderate-Low)	Good returns, but low adoption and high per-unit cost	Suitable for Tribal communities
Commercial Poultry	☆ (Low)	Very low income margins	Needs optimization or scale to become sustainable.

The feasibility ratings of different livestock enterprises highlight distinct economic and structural considerations. At the top of the spectrum, Sheep and Goat rearing receives the highest feasibility rating (★★★★★ - Very High). This category offers the best return on investment, particularly suited to smallholder farmers. With an average of 73 animals per household, the model balances scale with manageability, making it ideal for semi-arid and rainfed regions where fodder resources may be limited. The strong market for mutton and low maintenance costs contribute to its attractiveness.

Dairying follows with a high feasibility rating (★★★★). Despite higher input costs—particularly feed, health, and labour—it delivers high income and is particularly effective for farmers managing smaller herd sizes but located near milk collection centers or urban markets. The structured procurement networks offered by dairy cooperatives and private processors make this a reliable enterprise when infrastructure is supportive. However, it requires continuous technical and veterinary support, and is thus better suited to farmers with some level of knowledge or institutional linkage.

Backyard Poultry is rated as moderately feasible (⭐⭐⭐). Its appeal lies in being low-cost, scalable, and SHG-friendly, making it especially suitable for women-led self-help groups (SHGs) and marginal farmers. It provides a regular source of nutrition and modest income through egg and meat sales. However, its absolute returns per bird or unit are low, which means the impact on household income is marginal unless aggregated or supported by cooperatives or rural business hubs.

Piggery receives a moderate-to-low feasibility rating (⭐⭐). While the return per animal is relatively high, adoption remains limited, largely due to cultural perceptions, market barriers, and high per-unit costs (housing, feed, health). It is best suited for tribal or indigenous communities where traditional pig-rearing knowledge exists, but needs structured support in terms of market linkage and veterinary infrastructure to scale effectively.

Finally, Commercial Poultry ranks the lowest in feasibility (⭐ - Low). Despite large-scale operations, the income margins are very low, primarily due to volatile input costs (especially feed), market price fluctuations, and disease risks. The model only becomes viable when operated at a large scale with vertical integration, which places it out of reach for most smallholders unless supported by contract farming or large poultry integrators. Without strategic optimization or support (e.g., bulk feed procurement, veterinary coverage), its sustainability remains questionable for the average rural household.

Category	Feasibility Rating	Key Strength	Key Consideration	Ideal Target Group
Sheep & Goat	⭐⭐⭐⭐⭐ (Very High)	Best return on investment	Moderate-sized average holdings (73 animals); strong market demand for meat	Smallholder farmers in dryland & semi-arid areas
Dairying	⭐⭐⭐⭐ (High)	High income potential	Requires reliable market linkage and veterinary support; input-intensive	Farmers with small herds, near milk routes
Backyard Poultry	⭐⭐⭐ (Moderate)	Low-cost, women-friendly	Scalable, but per-unit returns are modest; strong potential in nutrition-sensitive areas	SHGs, women, landless & marginal farmers
Piggery	⭐⭐ (Moderate–Low)	High returns in tribal belts	Low adoption; high input costs and cultural constraints; market access needed	Tribal communities in Eastern Ghats/Agency areas
Commercial Poultr	⭐ (Low)	Potential scale, but currently unsustainable	Narrow profit margins; vulnerable to feed price fluctuations and disease outbreaks	Contract-integrated units or large farmers

4 ACCESS TO CREDIT AND INSURANCE

Financing Livestock Futures

This chapter explores the financial inclusion of livestock farmers, examining their access to credit, insurance, and banking services. It reveals that many farmers remain underserved by formal financial institutions, despite livestock's importance to rural livelihoods. Key topics include bank account ownership, the Pashu Kisan Credit Card (PKCC), and access to loans and microfinance. The chapter reviews livestock insurance for risks like death, disease, and theft, and discusses farmers' views on the claims process. It highlights the role of Self-Help Groups (SHGs) and cooperatives in improving credit access for women farmers. Challenges such as loan approval delays and high interest rates are identified, along with the need for emergency credit during crises, expanded outreach, simplified insurance, and tailored financial products for marginalized livestock farming communities.

KEY FINDINGS

Livestock farmers in Andhra Pradesh primarily rely on their own funds for investment, yet most of these self-financed farmers lack insurance coverage, exposing them to significant financial risk. Institutional finance sources like banks and SHGs offer slightly better insurance penetration, but coverage remains inconsistent and incomplete.

Government schemes and private financiers also show low effectiveness in ensuring insurance coverage, often due to implementation gaps and limited awareness. Farmers with full insurance are more financially diversified and have better access to formal credit, highlighting the role of insurance in enhancing financial inclusion.

Overall, the data points to a critical need for improving insurance literacy, integrating insurance with credit and subsidy programs, and transitioning informal investors into formal, insured systems to strengthen the resilience of the livestock sector.

SOURCE OF INVESTMENT AND INSURANCE COVERAGE

Source of Investment vs Insurance Coverage				
Source(s) of Investment	NOT INSURED	NOT AWARE	FULLY INSURED	PARTIALLY INSURED
BANK LOAN	7127	738	3010	6177
COOPERATIVE	411	95	170	412
GOVERNMENT SUBSIDY	776	127	526	803
MICROFINANCE	366	17	78	188
OWN FUNDS	50985	5123	13321	25053
PKCC	1593	135	1219	2236
PRIVATE FINANCE	1272	79	274	758
SHG/JLG/FPO	5317	409	1828	3294

The most prominent category by sheer volume is the “Own Funds” segment (fourth row), which represents the primary mode of livestock investment. A staggering 50,985 instances (Not Insured) and 5,123 (Not Aware) reflect a striking lack of formal risk protection, despite the high financial exposure involved. Although there is a significant number of Fully Insured (13,321) and Partially Insured (25,053) cases within this group, the fact that over 56,000 investors are either uninsured or unaware of their insurance status points to an urgent need for insurance literacy and product outreach targeting self-financing farmers. This is especially critical given the high vulnerability of livestock investments to disease, death, and climatic shocks.

Sources such as banks, microfinance institutions, SHGs, and cooperatives—typically associated with more formal financing—show better insurance engagement relative to informal sources. For instance, investments through banks (first row) show 3,010 Fully Insured and 6,177 Partially Insured cases. However, even here, 7,127 remain uninsured and 738 are unaware, which underlines that while access to formal finance can increase insurance penetration, it is by no means universal.

Among investors relying on community-based platforms like SHGs, Joint Liability Groups (JLGs), or Farmer Producer Organizations (FPOs) (fifth row), insurance coverage is moderately balanced: 1,219 Fully Insured and 2,236 Partially Insured, compared to 1,593 Not Insured. This suggests that these collectivized platforms do facilitate some access to insurance—likely due to group awareness or institutional facilitation—but that significant gaps still remain, especially at the level of complete insurance coverage.

Investments made via government subsidy routes (third row) reveal concerning patterns: while there are 526 Fully Insured and 803 Partially Insured cases, 776 remain uninsured and 127 are unaware. Given that many government programs explicitly include or mandate insurance coverage, these figures may suggest leakages in policy implementation, poor beneficiary communication, or administrative lapses.

Private lenders and microfinance institutions show highly fragmented insurance penetration. For instance, private finance (sixth row) has only 274 Fully Insured cases against 1,272 Not Insured, with 79 not even aware of their insurance status. Microfinance investments (second row) show similarly poor coverage with only 170 Fully Insured, 412 Partially Insured, and 506 falling in either uninsured or unaware categories. This reveals a structural issue—many non-bank financial intermediaries are not prioritizing insurance bundling or awareness despite their deep reach among marginalized populations.

The "Other" sources category (last row) likely includes informal channels like family borrowings, traders, or local moneylenders. This group records 5,317 Not Insured and 409 Not Aware, with only 1,828 Fully Insured. This segment likely represents the most financially exposed and least regulated part of the livestock finance ecosystem, warranting targeted intervention to transition informal investors towards formal, insured systems.

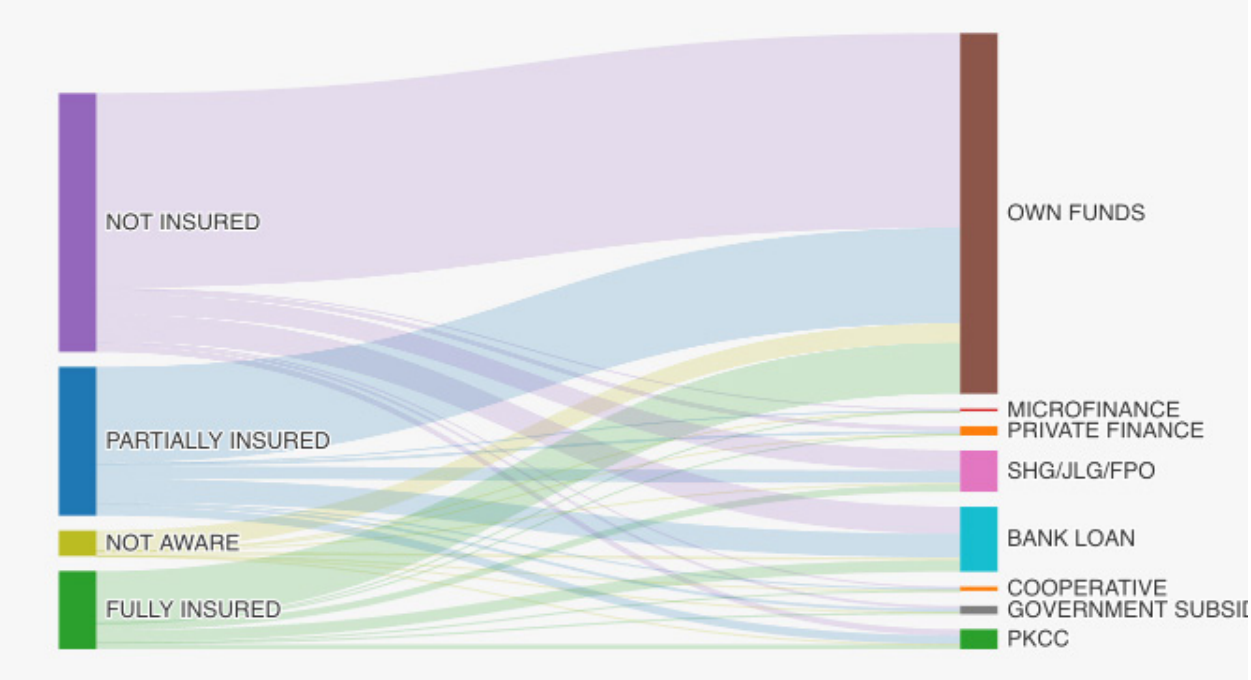
The insurance data underscores a systemic vulnerability in the livestock sector. ***Despite rising investments, a majority of farmers operate without adequate risk protection, particularly those relying on personal savings or informal sources. While institutional financing improves access to insurance, the gap remains wide even there. Bridging this gap will require integrated efforts across financial institutions, extension agencies, digital platforms, and policy mechanisms.***

With livestock playing a vital role in rural livelihoods, especially for women and marginal farmers, ensuring insurance coverage is not merely a financial safeguard—it is a critical development imperative.

INSURANCE COVERAGE

The Sankey diagram illustrating the relationship between livestock insurance status and financing sources reveals significant insights into the financial behavior and vulnerability of livestock farmers. A substantial majority of farmers who are not insured rely overwhelmingly on their own funds to support livestock-related expenses, signaling a major financial vulnerability. This overdependence on personal savings limits their ability to scale operations or absorb shocks such as disease outbreaks or market fluctuations.

Farmers who are partially insured exhibit slightly more diversified access to finance. While many still depend on their own funds, a considerable number also tap into institutional credit sources such as bank loans, SHG/JLG/FPO-based lending, and cooperative credit. This suggests that having even partial insurance coverage improves creditworthiness and financial inclusion.



Those with full insurance coverage demonstrate the most diversified and balanced financing profiles. In addition to their own funds, these farmers also access structured financing mechanisms such as bank loans, cooperative finance, Pashu Kisan Credit Cards (PKCC), and in some cases, government subsidy schemes. This pattern highlights the strong link between full insurance and broader access to affordable and reliable credit, enabling insured farmers to invest more confidently in scaling up their livestock enterprises.

On the other hand, farmers who are unaware of insurance or its benefits tend to mirror the behavior of uninsured groups, with a heavy reliance on personal funds and limited connection to formal financial institutions. This highlights a critical awareness and outreach gap, particularly among marginal and remote farmers.

Notably, ***across all categories—whether insured or not—the role of private finance, microfinance, and government schemes remains marginal, suggesting underutilization of potentially impactful financing options. This underscores the need for stronger integration of livestock insurance with formal credit and subsidy schemes, as well as targeted efforts to improve insurance literacy and trust in claim settlement processes.***

In sum, the data strongly advocates for improving insurance penetration as a strategic lever for enhancing the financial resilience and scalability of livestock farmers.

5

FEED AND FODDER AVAILABILITY

Nourishing livestock for sustainable productivity

This chapter lies in its central importance to livestock productivity, farmer incomes, and the overall resilience of the rural economy in Andhra Pradesh. Despite the state's significant livestock population, chronic deficits in green and dry fodder, high costs of commercial feed, and limited access to quality fodder seeds constrain the sector's growth. These challenges are especially acute during summer and drought periods, affecting animal health and milk/meat yields. Moreover, small and marginal farmers, who form the majority of livestock rearers, are disproportionately impacted due to limited land, water, and storage facilities for fodder cultivation. This chapter examines the current fodder ecosystem, regional disparities, farmer coping strategies, and the policy and institutional gaps that need to be addressed to ensure sustainable and inclusive livestock development.

KEY FINDINGS

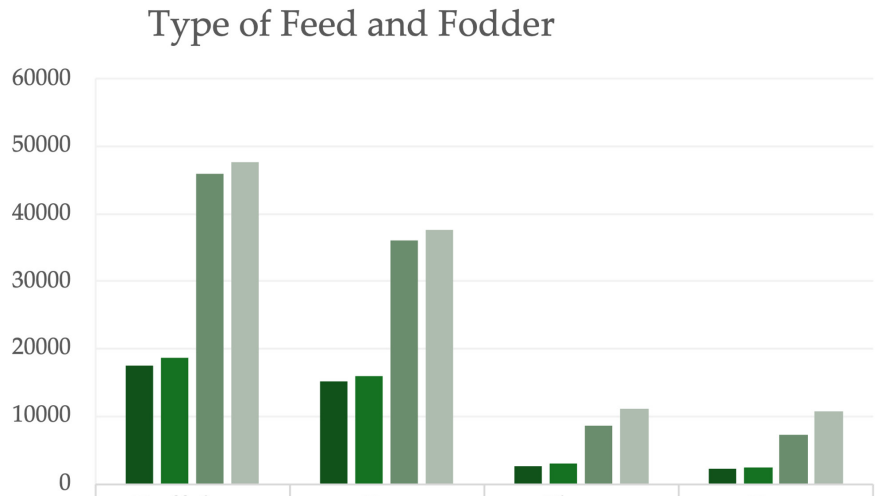
The analysis shows a strong correlation between land ownership and fodder access for livestock. Smallholders with less than 2 acres are most affected, with over 23,000 reporting insufficient fodder and needing support.

As landholding increases, farmers in the 2–4 acre range show improved self-reliance, with more able to cultivate or purchase fodder. Larger landholders (4–10 acres and over 10 acres) rely more on their own plots, leading to fewer reported shortages. Overall, land size is crucial for fodder security, with small and marginal farmers facing the greatest challenges.

Additionally, very few farmers utilize MGNREGS for fodder access, indicating a missed opportunity for integrating employment schemes with livestock support.

TYPE OF FEED ADMINISTERED BY LIVESTOCK FARMERS

The chart titled “Feed and Fodder vs Livestock” illustrates the usage of four different types of feed—mineral mixture, concentrate, dry fodder, and green fodder—across four major livestock categories: buffaloes, cows, sheep, and goats. The data reveals several key trends:



	Buffaloes	Cow	Sheep	Goat
Mineral Mixture	17498	15250	2651	2240
Concentrate	18670	16000	2952	2443
Dry Fodder	45863	36019	8567	7219
Green Fodder	47695	37600	11178	10703

Buffaloes and cows receive the highest levels of all feed types, indicating a more intensive and resource-rich management approach, likely due to their higher economic returns, especially in dairying. Green fodder and dry fodder are the most used, with buffaloes consuming the highest amount: 47,695 units of green fodder and 45,863 units of dry fodder.

Mineral mixture and concentrate usage is also higher in buffaloes and cows, suggesting more nutritional supplementation in these species compared to small ruminants.

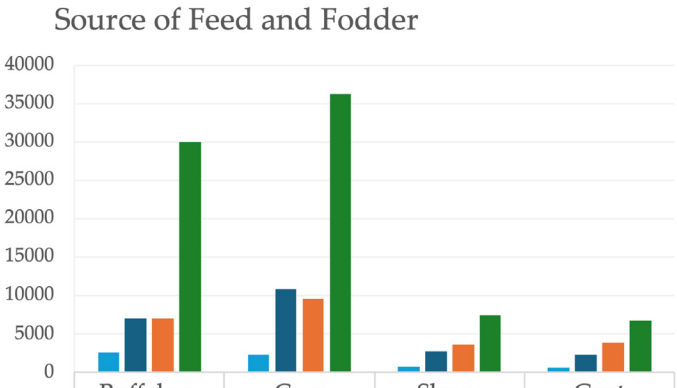
In contrast, sheep and goats receive significantly less feed overall, though green and dry fodder are still dominant. For example, sheep are fed 11,178 units of green fodder and 8,567 units of dry fodder, while goats receive 10,703 units of green fodder and 7,219 units of dry fodder.

The relatively low use of mineral mixtures and concentrates in small ruminants (sheep: 2,651 and 2,952; goats: 2,240 and 2,443 respectively) points to a nutritional gap that may affect productivity and health.

Overall, the data highlights the greater input intensity in large ruminant farming and suggests opportunities to improve feeding practices, particularly for sheep and goats, by promoting balanced rations and enhancing access to nutrient-rich feed.

SOURCE OF FEED AND FODDER

The chart titled “Source of Feed and Fodder” illustrates how livestock farmers access feed and fodder across four species—buffaloes, cows, sheep, and goats—from four sources: own fodder plots, market, MGNREGS, and cases where fodder is not available and support is needed.



	Buffaloes	Cow	Sheep	Goat
MGNREGS	2618	2310	688	579
Market	7009	10840	2772	2347
Not Available - Need Support	7024	9646	3540	3840
Own Fodder Plot	30008	36170	7512	6715

Own fodder plots are the most dominant source for buffalo and cow farmers, with 36,170 cow farmers and 30,008 buffalo farmers relying on their own cultivation. This indicates a relatively higher resource base and self-sufficiency among large ruminant farmers.

A significant number of farmers—especially those with cows (9,646) and buffaloes (7,024)—report unavailability of fodder and the need for support, signaling a critical gap in fodder security despite having own plots.

Market dependence is notable, particularly for cow farmers (10,840) and buffalo farmers (7,009), suggesting a commercial approach but also vulnerability to price fluctuations and supply inconsistencies.

Sheep and goat farmers show the least access to all sources, especially MGNREGS and own plots, pointing to higher vulnerability. Still, 7,512 sheep and 6,715 goat farmers use own plots, which is encouraging but relatively low in comparison to large ruminants.

The use of MGNREGS as a fodder source is minimal across all livestock categories, particularly underutilized for small ruminants (sheep: 688; goats: 579), indicating an untapped potential for public support schemes.

This data highlights a strong reliance on own land for fodder by better-off livestock farmers (buffaloes and cows), while also underlining a concerning level of fodder shortage, especially for smaller ruminant holders.

The findings call for targeted fodder security interventions through MGNREGS and structured support programs for landless and smallholder farmers, especially those dependent on sheep and goats.

LAND HOLDINGS & ACCESS TO FODDER

Land Cultivation Vs Access to Fodder - Dairying				
Extent of Land Cutivated	Access through MGNREGS	Procure from market	Own fodder plot	Not available - Need support
0.5-1 Acres	595	1679	1424	8516
1-2 Acres	1072	2966	2815	14972
2-4 Acres	1114	3195	3032	15311
4-10 Acres	394	1693	1270	6840
10 Acres & Above	59	300	212	1128

The data indicates that fodder availability is closely linked to landholding size among dairy farmers in Andhra Pradesh. Farmers cultivating less than 2 acres of land (comprising the 0.5–1 acre and 1–2 acre groups) form the bulk of those who reported that fodder was "not available – need support", with 8,516 and 14,972 farmers respectively in this category. This strongly suggests that smaller landholders struggle the most with fodder access, due to limited land for growing their own fodder and dependency on external sources or public support.

As landholding increases, dependency on external support decreases, and self-reliance improves. For example, among those cultivating 2–4 acres, while 15,311 still reported needing support, a substantial number—3,032—had their own fodder plots, and 3,195 were able to procure from the market, indicating a transition point where farmers begin to diversify their fodder access strategies.

Farmers with 4–10 acres of land show a further shift toward self-sufficiency: 1,270 of them rely on their own fodder plots, and 1,693 procure from the market, with a much smaller number (6,840) reporting lack of fodder. Those with 10 acres and above are the least vulnerable: only 1,128 reported fodder scarcity, and most rely on their own plots (212) or market procurement (300), showing that land ownership directly enables better fodder planning and production.

Interestingly, across all landholding categories, ***only a small fraction of farmers depend on MGNREGS for fodder-related access, suggesting that current fodder initiatives under employment guarantee schemes are either underutilized or insufficiently integrated into livestock support systems.***

6 TECHNOLOGY ADOPTION AND INNOVATION

Bridging tradition with innovation

In the evolving landscape of livestock farming, technology adoption is no longer a luxury but a necessity for enhancing productivity, efficiency, and sustainability. While traditional practices continue to play a role in rural livelihoods, integrating modern innovations—from mobile-based advisory services and mechanized feeding systems to health monitoring tools and AI-driven breeding solutions—can significantly transform outcomes for farmers. This chapter explores the extent to which livestock farmers in Andhra Pradesh are embracing technological solutions, the barriers they face, and the opportunities to bridge traditional knowledge with modern advancements to create resilient and future-ready livestock systems.

KEY FINDINGS

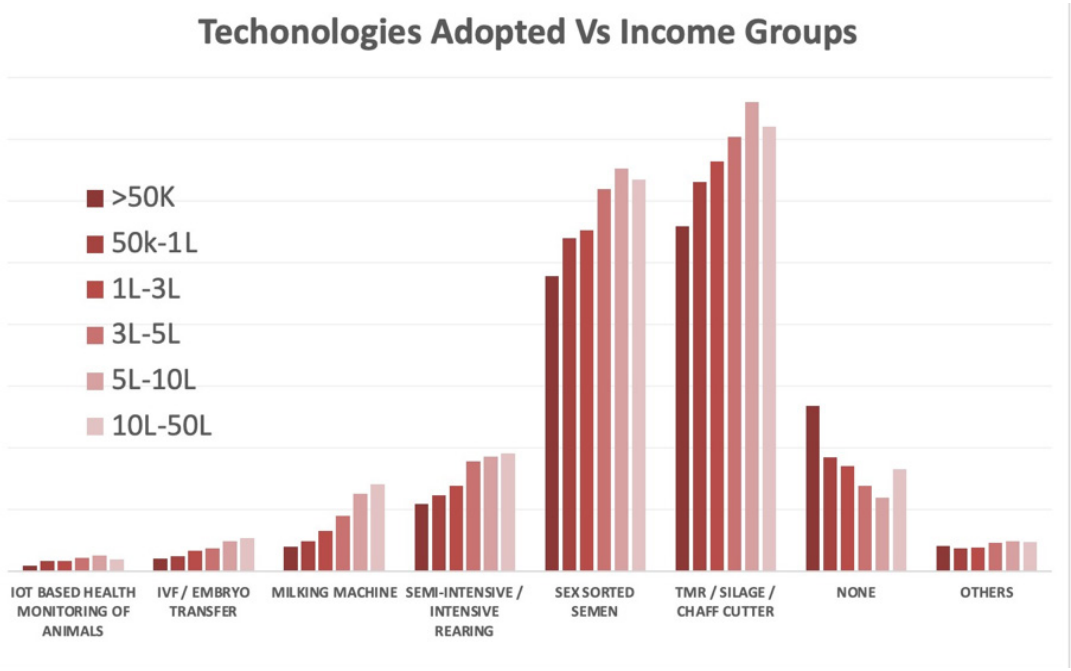
Technology adoption in livestock farming in Andhra Pradesh varies by income levels: Mid-income farmers (Rs.1–5 lakh annually) are the most active adopters of technologies like Total Mixed Ration (TMR), silage, and milking machines, driven by financial capacity and a desire to improve productivity.

Lower-income farmers (under Rs.50,000 annually) show minimal technology use, indicating a significant digital divide due to affordability and access issues. Wealthy farmers (Rs.10–50 lakh) tend to use fewer technologies, possibly due to a shift towards indirect management or diversified livelihoods.

Advanced technologies like IoT and IVF remain underutilized across income groups. There is a need for a tiered policy approach to address these disparities, including subsidized tools for smallholders and training for mid-tier farmers, to promote inclusive growth in the sector.

TECHNOLOGIES ADOPED

The data on technology adoption in bovine-based livestock management across income groups offers deep insights into the structural realities, constraints, and opportunities within the rural dairy sector. It reflects how income levels directly influence the uptake of agricultural technologies, with specific patterns emerging across the spectrum from low- to high-income farmers.



A critical takeaway is the dominant adoption of Total Mixed Ration (TMR), silage, and chaff cutters, along with sex-sorted semen, particularly among mid-income farmers earning between Rs.1–3 lakh and Rs.3–5 lakh annually. These technologies, which directly contribute to productivity improvements and reproductive efficiency, are widely embraced by farmers aiming to enhance yields and scale semi-commercial operations. The presence of 27,284 users for TMR/silage and 22,673 for sex-sorted semen in the Rs.1–3 lakh bracket alone underscores their significance as catalytic tools for operational intensification.

Importantly, this Rs.1–3 lakh income category emerges as the most technologically engaged segment, showing the highest adoption rates across nearly all technological options—from milking machines (2,711 users) to semi-intensive rearing (5,688 users). This reflects a “growth tier” of farmers who are financially stable enough to make strategic investments but are still driven by the need to improve margins and efficiency. Their behavior suggests that targeted support here could yield outsized returns in productivity and rural income generation.

In stark contrast, low-income farmers (Rs.1–50k) exhibit very limited technology adoption, with only 74 users for IoT-based monitoring and 159 for IVF. Instead, a large proportion—2,089 in this bracket—report using no technologies at all. This reflects not just affordability challenges, but also a lack of awareness, technical know-how, or access to basic infrastructure. This “none” category is a clear indicator of a digital and technological divide within the livestock economy, particularly affecting smallholders and the poorest households. Bridging this gap must become a core focus of inclusive rural development policy.

Advanced technologies like IoT-based animal health monitoring and IVF/embryo transfer show extremely low penetration across all income categories, including mid- and high-income farmers. For instance, only 723 farmers in the Rs.1–3 lakh bracket use IoT tools. This signals that these high-investment, knowledge-intensive technologies have not yet reached field-level maturity. Their low uptake may stem from cost, complexity, or unclear cost-benefit perception among farmers. Notably, adoption drops further at both ends of the income scale—suggesting that wealthier farmers might rely on outsourced services or labor rather than personally managing technology, while poorer farmers are simply priced out.

Technologies such as milking machines and semi-intensive rearing systems display moderate but steady adoption trends, especially within the Rs.1–5 lakh income range. Their adoption likely reflects gradual modernization, where tools that reduce labor dependency or improve efficiency are taken up incrementally as income grows and herd sizes expand. This points to an organic technology progression path that could be supported through phased financing and training.

An interesting structural insight is the sharp fall in technology adoption in the higher income bracket (Rs.10–50 lakh). Across nearly all technologies, usage declines among these wealthier farmers. This may be due to a transition away from direct livestock engagement towards more diversified livelihoods, or a management model where technology use is indirect—outsourced to professional services or farm workers. This shift suggests a strategic ceiling in technology adoption once farmers reach a certain income level, reinforcing the need to tailor interventions differently for high-income segments—possibly focusing on market access, value chain integration, or policy advocacy.

From a policy and programmatic perspective, the data underscores the urgent need to subsidize and promote entry-level technologies like chaff cutters and milking machines among lower-income groups, where even basic tools can significantly enhance productivity and reduce drudgery. The large proportion of farmers not using any technology demands intensive extension services, awareness programs, and peer demonstration models, particularly through Self-Help Groups (SHGs), Farmer Producer Organizations (FPOs), and digital channels.

Furthermore, the evident appetite for technology in the Rs.1–5 lakh bracket calls for dedicated livestock technology credit schemes, perhaps bundled with technical assistance and insurance, to accelerate enterprise scaling. Meanwhile, ***promoting adoption of advanced tools like IoT and IVF will require public-private partnerships (PPPs), incubation support, and field-level innovation trials, to lower costs and build trust. A robust monitoring framework should be established to track the real-world effectiveness of technology adoption and support adaptive, evidence-based scaling.***

In summary, the data paints a nuanced picture: technology uptake in livestock is stratified by income, with mid-tier farmers as the primary drivers of innovation.

> ***To fully leverage this potential, policies must be tiered and targeted, ensuring that smallholders are brought into the fold, mid-income farmers are empowered to grow, and high-end users are connected to broader ecosystem services. This layered strategy will be vital to unlocking the full productivity and livelihood potential of the bovine sector in Andhra Pradesh.***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7

CHALLENGES, ASPIRATIONS AND SUPPORT REQUIRED

Building a roadmap for inclusive livestock development

As Andhra Pradesh envisions a resilient and inclusive livestock economy, understanding farmers' aspirations, the challenges they face, and the kind of support they require becomes crucial. This chapter draws directly from the voices of livestock farmers, capturing not only their economic and social ambitions but also the systemic bottlenecks that constrain progress. It highlights the need for a farmer-centric development model—one that aligns policy interventions with grassroots realities and empowers smallholders, women, and youth through targeted support in finance, technology, markets, and capacity-building. By decoding their lived experiences and future goals, we can craft a roadmap that is grounded in local context yet geared toward transformational impact.

KEY FINDINGS

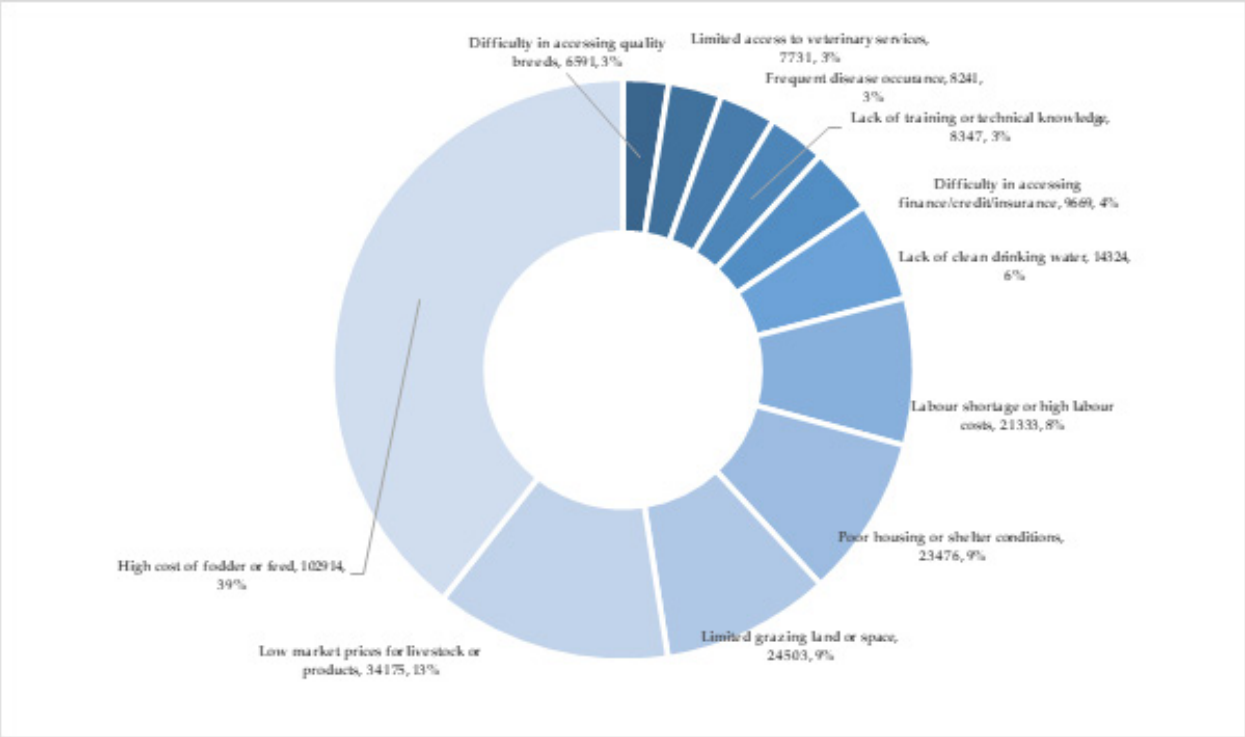
Livestock farmers in Andhra Pradesh face several challenges that impact productivity and income. Key issues include high feed and fodder costs, low market prices, and inadequate infrastructure. Access to veterinary services, credit, insurance, and training is particularly limited for smallholders.

Financial barriers such as delays in loan disbursement and high interest rates further complicate their situation. Market challenges exist with dependency on middlemen and poor connectivity to buyers. Technology adoption is low due to costs and lack of awareness.

The main needs identified by farmers include veterinary healthcare, feed and fodder, improved breeding services, and better access to insurance and credit. Overall, the sector requires comprehensive support for sustainable development.

OPERATIONAL CHALLENGES

Based on the data provided, livestock farmers in Andhra Pradesh face a range of systemic and operational challenges that vary by the type of livestock reared. Across all livestock categories, the high cost of fodder or feed emerges as the most frequently reported challenge. This issue is particularly acute among farmers rearing cows (34,571) and buffaloes (41,941), but it also significantly affects those raising sheep, goats, and backyard poultry, indicating a widespread strain on feed affordability and supply.



The low market price for livestock and related products is another major concern, especially among cattle and buffalo farmers, with 11,415 and 13,733 respondents respectively highlighting this issue. This suggests a pressing need for better market linkages, price support mechanisms, and value-chain improvements to ensure fair compensation for farmers' efforts.

Infrastructure-related challenges are also prominent. A large number of farmers reported limited access to grazing land or space, poor housing or shelter conditions, and labour shortages or high labour costs, particularly those managing buffaloes, cows, and small ruminants. For instance, 9,600 buffalo farmers reported limited grazing space, while over 9,000 cited poor housing as a challenge. This underscores the need for investment in basic livestock infrastructure and support for mechanization or shared labour services.

Access to services and knowledge remains a bottleneck. Many farmers across livestock types, especially those rearing buffaloes and cows, reported difficulties in accessing veterinary services, finance or insurance, and technical training. Over 3,700 buffalo farmers mentioned problems accessing credit or insurance, while more than 3,000 highlighted lack of veterinary care and technical knowledge as barriers. These gaps point to the necessity of strengthening rural financial inclusion, veterinary networks, and farmer education programs.

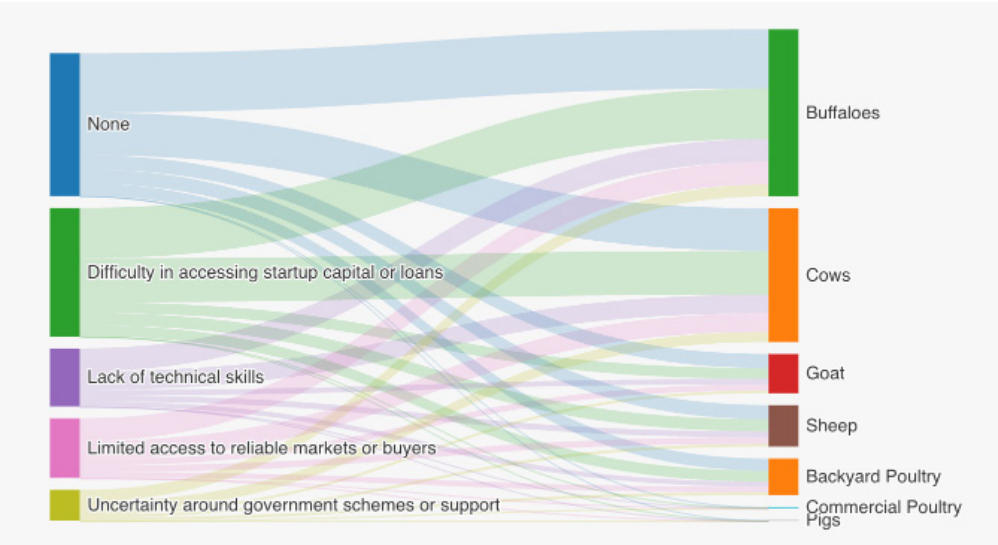
Small ruminants like sheep and goats face a mix of health and resource issues, with notable reports of frequent disease occurrence, limited grazing space, and market-related challenges. Piggery and poultry farmers, while fewer in number, also indicated feed costs and disease management as key concerns.

Interestingly, a significant portion of farmers – especially those managing buffaloes (5,168) and cows (2,924) – did not report any challenges. This could reflect relative satisfaction, resilience, or possibly underreporting due to survey fatigue or low expectations.

In summary, ***livestock farmers in the region are primarily burdened by high input costs, poor market returns, and inadequate support services. Addressing these challenges requires a multi-pronged approach that includes improving fodder and feed systems, enhancing veterinary and extension services, facilitating access to finance, upgrading infrastructure, and ensuring fair market access. These interventions will be crucial for improving livestock productivity, farmer incomes, and overall rural livelihoods.***

To truly unlock the potential of Andhra Pradesh's livestock sector, the state must go beyond piecemeal interventions and adopt an integrated livestock development strategy. By tackling input costs, expanding market access, modernizing infrastructure, and empowering farmers through training and financial inclusion, the state can ensure that livestock becomes a reliable source of livelihood, nutrition, and rural prosperity.

CATEGORY OF LIVESTOCK & RELATED CHALLENGES FACED BY FARMERS



The above Sankey diagram illustrates the diverse challenges faced by livestock farmers across different categories of animals. A significant number of buffalo and cow farmers report difficulty in accessing startup capital or loans, making financial barriers the most pressing issue overall. Lack of technical skills and limited access to reliable markets or buyers also emerge as common bottlenecks, especially for goat, sheep, and backyard poultry farmers—indicating the need for capacity-building and market linkage interventions in small ruminant and poultry sectors.

Interestingly, while some farmers across all sectors report no major challenges, the data also highlights uncertainty around government schemes as a concern across the board, albeit at a lower magnitude. This suggests a communication gap and calls for better awareness-building around policy support.

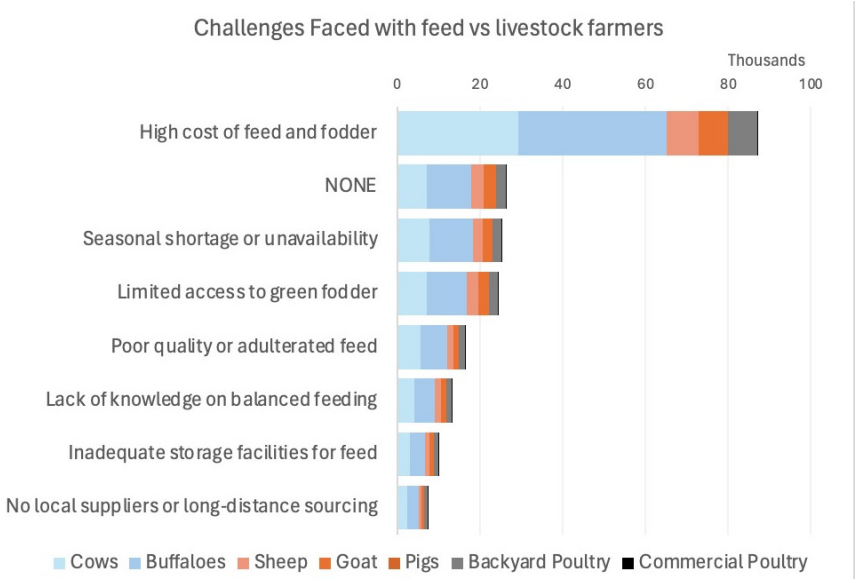
Overall, the diagram underscores the need for a multi-pronged strategy focusing on financial access, technical training, market integration, and streamlined policy communication to foster inclusive growth in the livestock sector.

FEED AND FODDER RELATED CHALLENGES

The data on challenges faced by livestock farmers with regard to feed and fodder reveals that feed-related constraints are both widespread and varied across different animal categories, significantly impacting livestock productivity and profitability in Andhra Pradesh.

The most pervasive issue across all livestock groups is the high cost of feed and fodder, reported by 29,282 cow farmers, 35,747 buffalo farmers, and over 7,000 sheep and goat rearers. This points to a critical economic barrier affecting both small and large ruminant production systems. The concern is especially severe among buffalo and cow rearers, likely due to their higher feed intake and dependence on external fodder sources for dairy productivity. Among backyard poultry farmers too, more than 7,000 have cited cost as a challenge, signaling the burden even in smaller operations.

Seasonal shortages and unavailability of feed emerge as another widespread challenge, especially for buffalo (10,434) and cow (7,798) farmers, reflecting the need for improved fodder conservation and year-round feed planning systems. This issue is compounded by limited access to green fodder, which affects over 7,200 cow farmers and nearly 10,000 buffalo farmers—suggesting that despite some efforts, sustainable green fodder cultivation is far from sufficient.



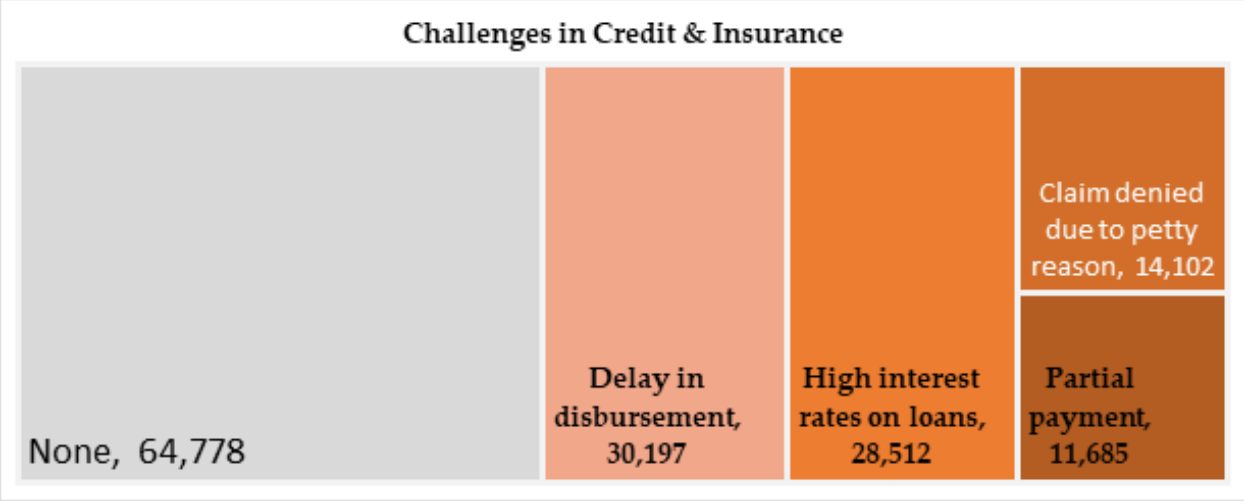
Poor quality or adulterated feed is reported by significant numbers—5,568 cow farmers and 6,464 buffalo farmers—raising concerns about food safety, animal health, and the regulation of the livestock feed market. Similarly, lack of knowledge on balanced feeding affects over 4,000 cow farmers and nearly 5,000 buffalo farmers, revealing a critical gap in extension services and farmer education, especially in nutrition-sensitive animal husbandry practices.

While inadequate storage facilities and long-distance sourcing due to absence of local suppliers were reported less frequently, these issues still affect a notable portion of farmers, especially those with limited mobility or access to market infrastructure. For instance, 3,654 buffalo farmers and over 1,000 sheep and goat farmers reported lack of storage as a key challenge.

Interestingly, a substantial number of respondents in every category, such as 10,591 buffalo farmers and 7,232 cow farmers, reported facing no feed-related issues. This suggests that while the problems are widespread, interventions like fodder plots, self-sufficiency in feed production, or better access to support systems have already helped a segment of farmers.

In summary, ***the feed-related challenges—particularly high cost, seasonal shortages, poor quality, and lack of knowledge—are systemic and impact both large-scale and smallholder livestock keepers. Addressing these requires a multipronged strategy: promoting local fodder cultivation (including through MGNREGS), regulating feed quality, expanding farmer training on animal nutrition, and improving storage and supply infrastructure. Solutions tailored to species-specific needs, especially for dairy and small ruminants, will be vital to boost livestock productivity and farmer resilience.***

CHALLENGES IN TERMS OF CREDIT & INSURANCE



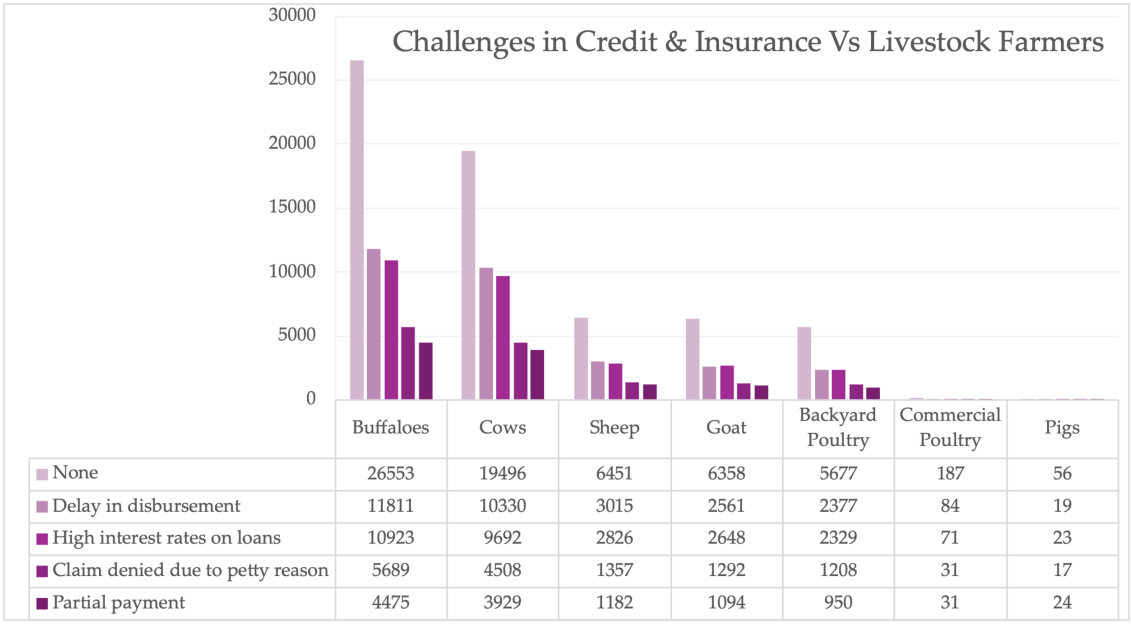
The tree-map offers important insights into the financial constraints and systemic issues faced by livestock farmers. Encouragingly, a substantial number—64,778 farmers—reported no challenges related to credit or insurance. This suggests that for a significant portion of the population, the existing financial services infrastructure is functioning smoothly and is accessible without major hindrances.

However, the remaining farmers, who did report difficulties, bring attention to several critical gaps that require policy attention. The most frequently reported issue is delay in disbursement, with 30,197 farmers affected. Delayed credit disbursement can severely impact time-sensitive agricultural and livestock decisions, such as purchase of feed, veterinary care, or infrastructure upgrades, ultimately reducing productivity and income. This highlights the need for more efficient and timely delivery mechanisms in credit systems.

Close behind is the issue of high interest rates on loans, reported by 28,512 respondents. High borrowing costs reduce the profitability of livestock operations and can discourage investment in modern technologies or expansion. This is particularly concerning for small and marginal farmers who rely heavily on loans to sustain their livelihoods. Addressing this would require targeted interest subvention schemes or the promotion of low-interest credit through cooperative or government-backed institutions.

In the domain of insurance, two prominent challenges emerge. First, 14,102 farmers reported that their insurance claims were denied due to petty or procedural reasons. This undermines the very purpose of agricultural insurance, which is to provide financial protection in times of distress. Such denials, often due to rigid or opaque procedures, erode trust in insurance systems and lead to under-enrolment in these schemes. Second, 11,685 respondents mentioned partial payments of insurance claims, indicating issues with valuation, damage assessment, or administrative lapses. These partial payments can leave farmers inadequately compensated for their losses.

CHALLENGES IN CREDIT & INSURANCE INTERMS OF LIVESTOCK CATEGORIES



	Buffaloes	Cows	Sheep	Goat	Backyard Poultry	Commercial Poultry	Pigs
None	26553	19496	6451	6358	5677	187	56
Delay in disbursement	11811	10330	3015	2561	2377	84	19
High interest rates on loans	10923	9692	2826	2648	2329	71	23
Claim denied due to petty reason	5689	4508	1357	1292	1208	31	17
Partial payment	4475	3929	1182	1094	950	31	24

The data reveals that while a substantial proportion of livestock farmers report no major issues with credit or insurance—especially among buffalo and cow owners (26,553 and 19,496 respectively)—a significant number still face systemic hurdles. Delays in disbursement remain a key challenge, affecting over 10,000 buffalo and cow farmers, followed closely by high interest rates on loans, which impact around 10,923 buffalo farmers and 9,692 cow farmers. Denial of insurance claims for minor reasons and partial payments also feature prominently, with more than 5,000 buffalo farmers and 4,000 cow farmers affected.

Sheep and goat farmers show moderately lower total numbers, but the frequency of reported challenges like delays (3,015 and 2,561 respectively) and high interest rates (2,826 and 2,648 respectively) indicates ongoing difficulties in accessing affordable and timely financial support. The challenges among backyard poultry farmers mirror this trend, with over 2,000 citing delays, high interest, and insurance complications—despite being perceived as low-risk sectors.

In contrast, commercial poultry and pig farmers report the fewest absolute issues, but this may be due to limited participation or lower penetration of formal financial systems in these segments, not necessarily better service access. Notably, pig farmers report the least engagement with the financial ecosystem, suggesting a need for targeted inclusion.

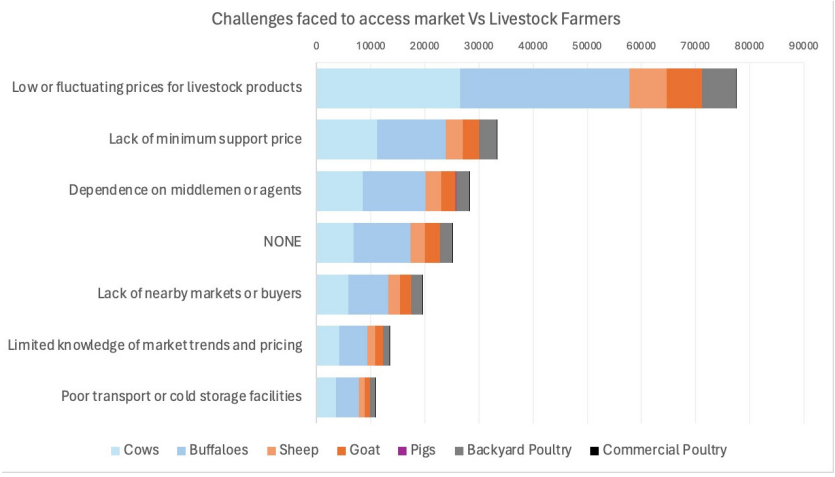
Overall, the chart underscores the persistent bottlenecks in the credit and insurance ecosystem for livestock farmers. While some farmers are managing without issues, thousands face delays, costly loans, and non-transparent claim processes—pointing to an urgent need for financial reforms, better grievance redressal mechanisms, and inclusive insurance coverage across all livestock categories.

The data reveals persistent credit and insurance challenges faced by livestock farmers in Andhra Pradesh. While a significant proportion of buffalo and cow farmers report no issues, a substantial number face delays in disbursement, high interest rates on loans, and insurance claim rejections or partial payments. These financial barriers not only

Addressing these issues through timely, affordable credit, simplified insurance processes, and inclusion of underrepresented sectors is critical for enabling sustainable, livestock-led rural growth.

CHALLENGES RELATED TO MARKET LINKAGES

The data on challenges faced by livestock farmers in accessing markets highlights systemic bottlenecks that are affecting income realization and market participation across all species. A strong reliance on informal market mechanisms, lack of infrastructure, and price volatility are common across cattle, small ruminants, and poultry farmers. The situation is particularly acute for dairy farmers, who dominate the landscape and face the most widespread market-related constraints.



Low or fluctuating prices emerge as the most frequently cited challenge, especially among cow (26,495) and buffalo (31,243) farmers. This indicates high vulnerability to market price dynamics, with seasonal gluts, poor product differentiation, and lack of price protection mechanisms severely impacting farmer incomes.

Dependence on middlemen or agents is another significant concern, with 11,529 buffalo and 8,521 cow farmers reporting this as a barrier. This reliance often reduces bargaining power and transparency in pricing, reinforcing a cycle of low returns.

A substantial number of farmers also report the absence of minimum support prices (MSP) as a barrier—this includes 12,665 buffalo, 11,204 cow, and around 3,000 sheep and goat farmers. The lack of assured pricing or floor price for milk, meat, and live animals is especially problematic for those with limited scale or storage options.

The issue of poor transport or cold storage infrastructure, while less frequently cited in comparison, still affects thousands (e.g., 4,204 buffalo and 3,568 cow farmers). This points to a critical gap in post-production handling, especially for perishable commodities like milk, poultry, and pork.

Limited market knowledge—cited by over 5,000 buffalo and 4,000 cow farmers—indicates weak last-mile extension and lack of market intelligence systems. Farmers are often unaware of real-time prices, demand trends, or grading standards, limiting their ability to optimize returns.

The challenge of inadequate nearby markets or buyers, with over 7,300 buffalo and 5,800 cow farmers affected, is indicative of poor rural-urban market connectivity and perhaps inadequate investment in rural livestock mandis or collection points.

Interestingly, while many farmers report these challenges, a significant subset (e.g., 10,418 buffalo and 6,860 cow farmers) report no market access issues, possibly reflecting those linked to organized value chains, cooperatives, or dairy unions with assured buyback.

Overall, the ***data strongly suggests the need for systemic interventions to stabilize livestock product prices, improve market access and information, and build decentralized infrastructure—especially for milk and meat—to reduce losses and dependency on informal actors.***

CHALLENGES IN ADOPTING TECHNOLOGY

Challenges with adopting technologies vs livestock farmers							
Challenges faced with adopting technologies	Livestock Farmers						
	Cows	Buffaloes	Sheep	Goat	Pigs	Backyard Poultry	Commercial Poultry
Access to the technologies	3434	3698	1143	1011	15	884	38
Difficulty in operating or maintaining the technology	5084	5821	1575	1486	20	1424	34
High cost of technology or equipmentice	13405	16210	3553	3279	31	3518	111
Lack of awareness about available technologies	13345	16145	3989	3702	40	3129	101
Limited access to technical support or service providers	2917	3504	1032	949	6	870	41
NONE	14527	20051	5002	5022	41	4312	140

The table provides an insightful overview of the challenges faced by livestock farmers in adopting various technologies across different types of animals, including cows, buffaloes, sheep, goats, pigs, backyard poultry, and commercial poultry.

Access to the Technologies emerges as a considerable hurdle for farmers, particularly for buffaloes and sheep, with 3,698 and 3,543 farmers respectively facing this challenge. This indicates a significant barrier in reaching technology for these groups, impacting their ability to integrate modern advancements into their farming practices.

Operating or Maintaining the Technology appears to be less of an issue on a broad scale, yet commercial poultry farmers report difficulty, with 111 farmers highlighting this problem. This suggests that while access might be achieved, ongoing operation and maintenance pose practical challenges in this category.

The High Cost of Technology or Equipment is a major concern, particularly for cow and buffalo farmers, with 14,053 and 16,210 struggling with this issue. These high numbers reflect a substantial financial barrier, potentially limiting these farmers from benefiting fully from technological advancements.

Lack of Awareness about Available Technologies affects a considerable number, specifically goat farmers (13,345). This lack of information could hinder the potential productivity improvements that technology offers, indicating a need for enhanced information dissemination and education.

Limited Access to Technical Support or Service Providers is less frequently reported but affects specific categories, such as buffaloes (5,157). This points to a gap in the availability of essential follow-up support, which is critical for the prolonged effectiveness and adoption of new technologies.

Interestingly, a significant proportion of farmers reported no challenges—particularly in the cow and buffalo categories, with 14,527 and 20,051 farmers respectively indicating they face no barriers. This could reflect effective dissemination or adaptation strategies already in place for these groups, or possible variances in technological needs and applications.

In conclusion, ***the report highlights key areas where livestock farmers face challenges in technology adoption, providing a basis for targeted interventions. Addressing cost barriers, improving access, and enhancing awareness and support systems stand out as pivotal steps toward optimizing technology use in livestock farming.***

CHALLENGES BEFORE ENTREPRENEURIAL ASPIRATIONS

The data provides a comprehensive overview of the challenges faced by livestock farmers in pursuing entrepreneurial aspirations across different categories, including cows, buffaloes, sheep, goats, pigs, backyard poultry, and commercial poultry. Among the most prominent issues is the difficulty in accessing startup capital or loans, which poses a significant barrier for farmers, especially those involved in buffalo and cow farming. Specifically, 16,288 buffalo farmers and 8,112 cow farmers reported this challenge, highlighting the critical need for improved access to financial resources such as microfinance, credit schemes, and government support programs to facilitate entrepreneurial expansion.

In addition to financial barriers, many farmers face difficulties related to acquiring the necessary technical skills to effectively manage and grow their enterprises. Buffalo farmers notably reported high challenges in this area, with 8,552 expressing a lack of technical expertise. Addressing this gap through targeted skill development initiatives and training programs could empower farmers to better navigate entrepreneurial activities and maximize their productivity.

Challenges related to entrepreneurial aspirations vs Livestock Farmers							
Challenges related to entrepreneurial aspirations	Livestock Farmers						
	Cows	Buffaloes	Sheep	Goat	Pigs	Backyard Poultry	Commercial Poultry
Difficulty in accessing startup capital or loans	16288	18805	4501	4019	42	4078	125
Lack of technical skills	6911	8552	2191	2038	27	1824	59
Limited access to reliable markets or buyers	6876	8397	2452	2262	25	2061	64
Uncertainty around government schemes or support	3842	4412	1047	997	14	1064	42
or business knowledge	6911	8552	2191	2038	27	1824	59
training	6911	8552	2191	2038	27	1824	59
NONE	15866	22005	5254	5254	41	4522	152

Access to reliable markets and buyers is another significant challenge, particularly for sheep and goat farmers, who reported difficulties in this aspect with 2,652 and 2,274 farmers affected respectively. Improving market connectivity, infrastructure, and information dissemination is vital to enable these farmers to access broader markets, sell their products at fair prices, and sustain their businesses.

Uncertainty around government schemes or support programs also emerged as a concern, especially among cow farmers, with 3,842 farmers reporting a lack of clarity or awareness regarding available support. This indicates a need for more effective communication, publicity, and outreach efforts to ensure farmers are aware of government initiatives that can aid their entrepreneurial pursuits.

While challenges related to limited access to reliable markets, technical skills, and financial resources are prominent, it is noteworthy that a considerable number of farmers in several categories report no significant obstacles. For example, 15,866 cow farmers and 22,055 buffalo farmers indicated they face no challenges in entrepreneurial activities, which could reflect existing successful support systems or greater familiarity with entrepreneurship in those groups.

Overall, ***the challenges faced by livestock farmers in pursuing entrepreneurial ambitions are multifaceted, encompassing financial, technical, and market-related barriers. To foster a vibrant entrepreneurial ecosystem within the livestock sector, targeted interventions are essential. These include improving access to affordable credit, offering tailored skill development and business training programs, strengthening market linkages, and enhancing the dissemination of information about government schemes and support mechanisms.***

Addressing these issues holistically can significantly enhance farmers' capacity to innovate, expand their enterprises, and ultimately improve their livelihoods and the overall productivity of the livestock sector.

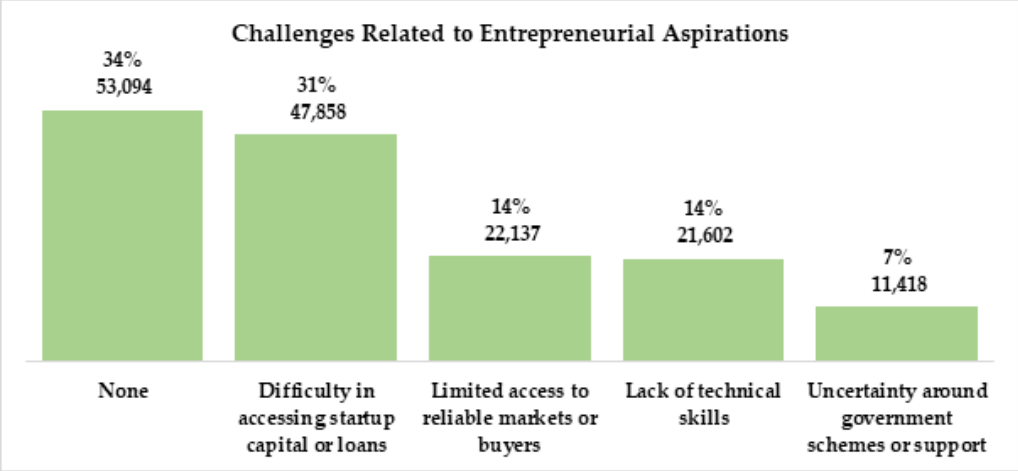
The critical points from the data highlight key challenges faced by livestock farmers in pursuing entrepreneurial aspirations:

1. **Access to Startup Capital and Loans:** The most significant obstacle, especially for buffalo (16,288) and cow (8,112) farmers, indicating a pressing need for better financing options.
2. **Lack of Technical Skills:** A major barrier for buffalo farmers (8,552), underscoring the importance of targeted skill development and training programs.

3. **Limited Market Access:** Sheep (2,652) and goat (2,274) farmers struggle to find reliable markets and buyers, highlighting the need for improved market infrastructure and connectivity.
4. **Uncertainty around Government Schemes:** Particularly impacting cow farmers (3,842), pointing to the necessity for better communication and awareness of available support programs.
5. **Overall Readiness:** A significant number of farmers, especially in the cow (15,866) and buffalo (22,055) categories, report no challenges, indicating existing strengths and opportunities for scaling up successful practices.

Addressing these critical barriers through financial support, skill enhancement, market linkages, and better information dissemination is essential to promote entrepreneurship in the livestock sector.

OVERALL CHALLENGES BEFORE ASPIRATIONS



The bar chart titled "Challenges Related to Entrepreneurial Aspirations" highlights the key barriers faced by livestock farmers in pursuing entrepreneurship. Notably, 34% (53,094 respondents) reported facing no significant obstacles, suggesting that a sizable group of farmers are confident and ready to engage in entrepreneurial activities, given the right opportunities.

However, 31% (47,858 respondents) cited difficulty in accessing startup capital or loans as a major constraint. This aligns with earlier findings on credit-related challenges and reinforces the critical need for accessible, farmer-friendly financing mechanisms to support enterprise development.

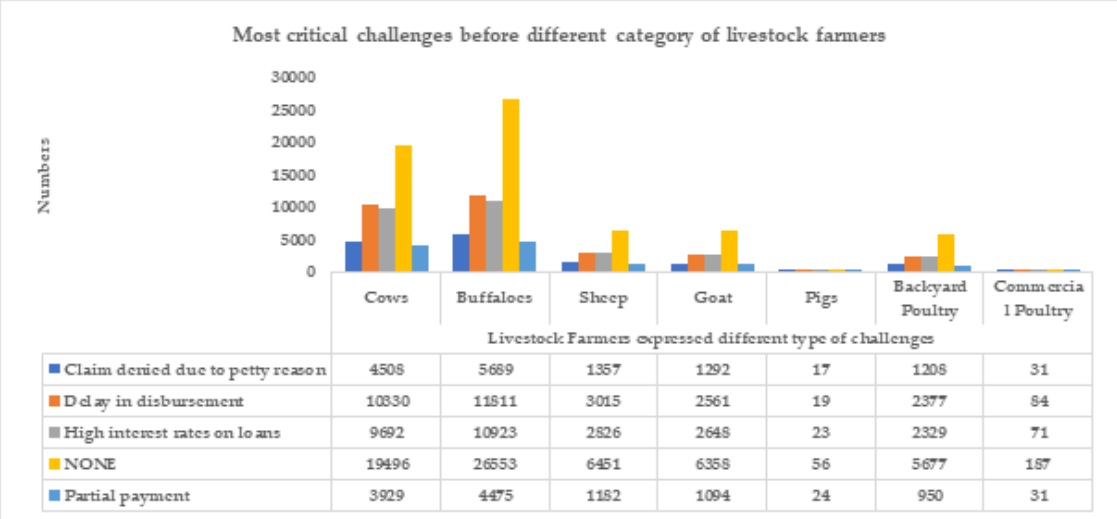
Additionally, 14% each pointed to limited access to reliable markets or buyers (22,137 respondents) and a lack of technical skills (21,602 respondents) as barriers. These issues reflect structural weaknesses in value chains and capacity building—factors that can directly affect the success and sustainability of livestock-based enterprises.

Lastly, 7% (11,418 respondents) expressed uncertainty around government schemes or support, indicating a gap in awareness, outreach, or trust in public programs designed to promote rural entrepreneurship.

In summary, while a **considerable portion of farmers feel ready to pursue entrepreneurial ventures, the remaining face interconnected challenges related to finance, skills, market access, and institutional support, which must be addressed through a coordinated and inclusive policy approach.**

MOST CRITICAL CHALLENGES

The chart titled **"Most critical challenges before different category of livestock farmers"** presents key financial and institutional constraints experienced by livestock farmers across species. The challenges include claim denial, delays in disbursement, high loan interest rates, partial payments, and instances where no issues were reported.



	Cows	Buffaloes	Sheep	Goat	Pigs	Backyard Poultry	Commercial Poultry
Claim denied due to petty reason	4508	5689	1357	1292	17	1208	31
Delay in disbursement	10330	11811	3015	2561	19	2377	84
High interest rates on loans	9692	10923	2826	2648	23	2329	71
NONE	19496	26553	6451	6358	56	5677	187
Partial payment	3929	4475	1182	1094	24	950	31

A large proportion of dairy (cow and buffalo) farmers reported significant financial and institutional bottlenecks. Specifically, 11,811 buffalo farmers and 10,330 cow farmers faced *delays in disbursement*, making it the most cited financial barrier. These delays likely impede timely investment in fodder, animal care, and infrastructure. Similarly, high interest rates on loans affected over 10,000 buffalo and 9,600 cow farmers, indicating a need for affordable credit tailored to livestock cycles.

Additionally, a substantial number of claims were denied due to petty reasons—5,689 for buffalo farmers and 4,508 for cow farmers—highlighting a pressing issue with insurance efficiency and grievance redressal mechanisms. Smaller species like goat and sheep farmers also encountered notable difficulties, especially related to *interest rates* and *disbursement delays*, although at a smaller scale.

In the case of backyard poultry, although fewer in number, over 2,300 farmers cited high interest rates, and more than 2,300 mentioned delays, signaling that even micro-enterprises face systemic finance-related hurdles.

Interestingly, a significant number of farmers across all species—over 26,000 for buffaloes and nearly 20,000 for cows—reported no issues, suggesting that some are either better integrated into formal support systems or possibly less reliant on institutional finance.

Finally, partial payments, while less frequent, still impacted hundreds of farmers across livestock categories, eroding trust in formal insurance and credit delivery.

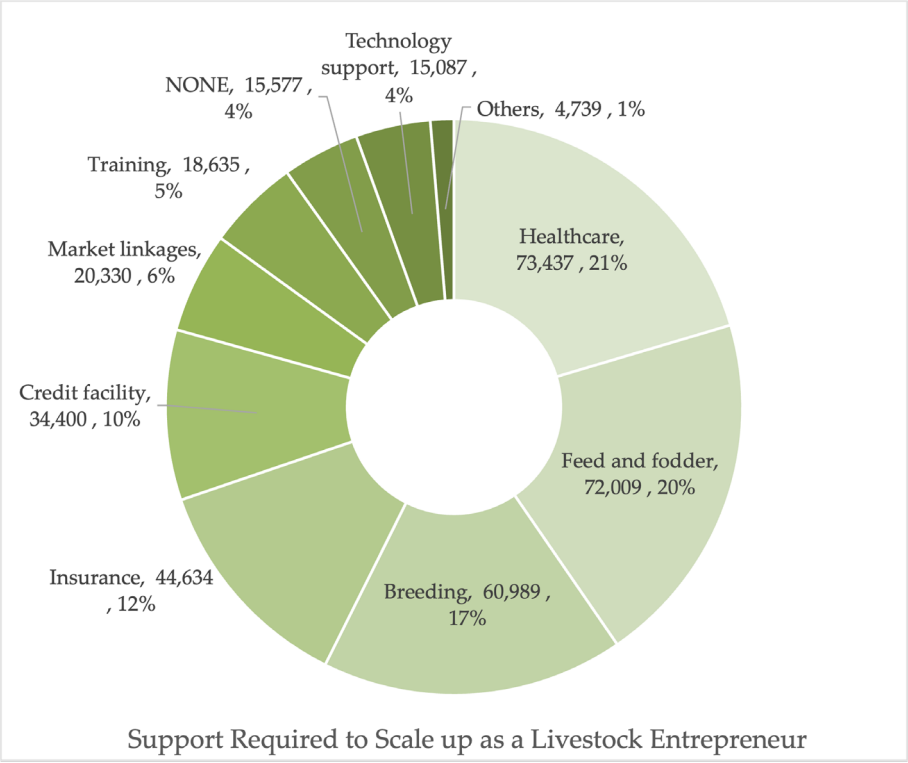
Overall, the data reveals that Buffalo and cow farmers are most exposed to systemic issues in loan disbursement

High interest rates remain a cross-cutting constraint, even for small livestock and poultry units. Financial inclusion efforts must improve both delivery efficiency and affordability, especially for women, marginal, and tribal farmers.

SUPPORT REQUIRED TO BECOME ENTREPRENEUR

The data on support required to scale up as a livestock entrepreneur across different livestock categories presents a comprehensive view of the needs expressed by farmers to move from subsistence-level livestock keeping to more sustainable, profitable entrepreneurship.

Among all categories, healthcare and feed & fodder support emerged as the top priorities for livestock farmers, especially for those engaged in cattle and buffalo rearing. Over 24,000 cow farmers and 28,000 buffalo farmers highlighted the need for improved animal healthcare, closely followed by feed and fodder access (24,251 and 28,611 farmers, respectively). These indicate foundational deficits in veterinary infrastructure and fodder security that are vital for scaling productivity and reducing mortality.



Support Required to Scale up as a Livestock Entrepreneur

Breeding support was the third-most cited requirement, with over 21,000 cow farmers and 25,000 buffalo farmers expressing the need for improved genetics and access to artificial insemination or quality male animals. This points to a critical demand for genetic upgradation to enhance milk yield and disease resistance.

Insurance and credit facilities were significant concerns across species. Insurance was sought by over 15,000 cow farmers and nearly 17,000 buffalo farmers, indicating both an awareness of risk and gaps in current coverage. Similarly, the demand for credit was pronounced (11,085 and 13,785 for cows and buffaloes respectively), emphasizing the need for low-interest, livestock-specific financing options.

For sheep and goat rearers, healthcare and feed also topped the list, with over 7,000 farmers in each category citing these needs. The goat and sheep sectors, often dominated by marginal and tribal farmers, are clearly constrained by basic service deficits rather than capital-intensive requirements.

Backyard poultry farmers prioritized healthcare (5,868), feed (5,653), and breeding (4,465), reflecting a growing entrepreneurial potential in this low-cost, high-turnover activity. Their support needs are manageable with well-targeted extension and convergence with SHG programs.

Interestingly, training and technology support, while less prioritized than operational inputs, still drew demand from several thousand farmers—especially in cow and buffalo sectors—pointing to a growing aspiration for knowledge-driven farming.

At the other end of the spectrum, market linkages were relatively under-reported, with fewer than 8,000 farmers (across all categories) citing it as a need.

This may indicate: ***A lack of awareness of marketing potential, prioritization of production bottlenecks first, or Entrenched dependence on traditional intermediaries.*** A small proportion of farmers (ranging from 4–7%) said they needed no support, possibly indicating either satisfaction with current systems or low levels of ambition to scale.

SUPPORT REQUIRED TO SCALE UP

The chart titled "Support Required to Scale Up as a Livestock Entrepreneur" provides a comprehensive view of the diverse needs expressed by livestock farmers to grow their enterprises. A significant portion of farmers—73,437 respondents (21%)—identified veterinary healthcare as their most critical requirement. This underscores persistent gaps in animal health infrastructure, such as limited access to veterinary professionals, vaccines, and diagnostic services, which are essential for maintaining livestock productivity and minimizing mortality.

Closely following is the need for feed and fodder, reported by 72,009 farmers (20%). This reflects the pressing challenge of ensuring year-round availability of quality nutrition, which is often hampered by seasonal shortages, rising costs, and lack of local fodder cultivation. Breeding support is the third most cited requirement, with 60,989 respondents (17%) highlighting the demand for improved genetics, artificial insemination services, and access to quality breeds that can enhance milk yield, meat production, and overall farm income.

On the financial side, insurance (44,634; 12%) and credit facilities (34,400; 10%) emerge as important areas. Farmers are seeking more reliable insurance coverage and easier access to timely, affordable credit to support investment and mitigate risks. This resonates with earlier findings on challenges in credit and insurance, indicating a strong need for reforms in rural financial systems. Additionally, market linkages (20,330; 6%) and training (18,635; 5%) are identified as enabling factors that can help farmers improve their marketing outcomes and technical know-how, respectively.

Smaller proportions of farmers seek technology support (15,087; 4%), or report no immediate need (15,577; 4%), while a minimal 1% (4,739 respondents) fall under "others," suggesting localized or less common concerns.

Overall, the findings point to a multi-dimensional support ecosystem that is essential for transforming livestock farmers into sustainable entrepreneurs.

The most urgent needs—healthcare, fodder, breeding, and financial services—should form the core pillars of any livestock development strategy. Complementary interventions in skilling, market access, and technology adoption can further amplify the impact and ensure inclusive growth in the rural livestock economy.

8 CONCLUSIONS AND POLICY RECOMMENDATIONS

The findings of the rapid survey of 1,01,657 livestock farmers in Andhra Pradesh highlight both the opportunities and structural challenges within the sector. While livestock remains a critical source of livelihood and supplementary income—particularly for women and smallholders—it is clear that most farmers are operating below their potential due to limited access to finance, technology, markets, quality feed, and enterprise support systems. Despite strong government efforts and community-based models like SHGs, gaps in implementation, outreach, and scale continue to constrain growth.

As the state envisions a zero-poverty, enterprise-driven rural economy by 2049, livestock must be repositioned not just as a support activity, but as a strategic enterprise sector requiring dedicated policy, institutional backing, and ecosystem support. The conclusions derived from this study inform a set of targeted policy recommendations aimed at shifting the sector from subsistence-level rearing to sustainable, scalable, and market-linked entrepreneurship.

These policy directions are designed to align with the state's long-term development goals—focusing on integrated financial inclusion, technology adoption, market access, skill development, and institutional handholding—ensuring that livestock farmers become active participants in Andhra Pradesh's inclusive growth story.

GAPS EMERGING

Based on the extensive livestock farmer survey conducted in Andhra Pradesh, the following critical gaps have emerged, cutting across production, infrastructure, services, markets, and policy access:

1. **High Input Costs and Feed Insecurity:** **Feed and fodder** costs are the most frequently reported challenge across all livestock categories, especially for bovines and poultry. **Seasonal shortages,** lack of green fodder, poor storage, and long-distance sourcing are widespread, reducing productivity. **Low awareness of balanced feeding** is another major gap, particularly among smallholder and backyard farmers.
2. **Limited Market Access and Price Instability:** A **high dependence on middlemen,** lack of nearby markets, and absence of **Minimum Support Price (MSP)** leave farmers vulnerable to price exploitation. **Price volatility** is a serious concern, especially for dairy, small ruminants, and poultry producers. **Transport and cold chain infrastructure** is underdeveloped, compounding losses.
3. **Weak Access to Credit, Insurance, and Institutional Support:** A significant number of farmers report **inability to access finance**, insurance, and formal risk mitigation tools. Despite the high risk associated with livestock rearing, **insurance penetration is low;** many farmers are unaware or lack access to viable schemes. Formal support from cooperatives, FPOs, or government line departments is inconsistent.
4. **Healthcare and Veterinary Services Deficit:** **Frequent disease outbreaks** are reported by all livestock farmers, worsened by **shortages of veterinary personnel, medicines, and timely support. Preventive care and vaccinations** are often delayed or unavailable, especially in remote areas.
5. **Technology and Knowledge Gaps:** Most farmers still do not use advanced technologies (IoT, IVF, milking machines), especially in low-income groups. A **digital and skills divide** exists — limiting productivity gains from modern practices. Demand for **training and capacity-building** is high, but service delivery is fragmented.
6. **Women and SHG Livestock Farmers Underserved:** **Backyard poultry and goat rearing**, where women and SHGs dominate, show **low productivity and income per unit,** primarily due to lack of inputs, healthcare, and market linkages. Despite their potential, these enterprises remain **underfunded and unsupported.**
7. **Land and Fodder Access Constraints:** Farmers with **less than 2 acres** struggle the most with fodder, relying heavily on market purchase or requiring MGNREGS support. There is a **disconnect between land use planning and fodder cultivation** at the village level.
8. **Fragmented Entrepreneurial Ecosystem:** While many farmers express **willingness to scale up** or start enterprises, they lack **support systems, mentorship, and handholding.** Support for **semi-intensive or commercial rearing systems** remains piecemeal.

SUMMARY OF THE REPORT:

1. **Insurance Status and Credit Access:** Most livestock farmers are either uninsured or only partially insured, with a large majority depending on their own funds. Those with full or partial insurance have relatively better access to institutional credit such as bank loans, cooperatives, and SHG/JLG/FPO support. Insurance coverage appears to be positively associated with financial inclusion and access to diversified sources of capital. However, government support and microfinance are underutilized across all insurance groups.

2. **Enterprise Feasibility:** Sheep and goat rearing was rated the most feasible enterprise due to high returns and suitability for smallholders. Dairying is also highly feasible, especially for farmers with smaller herd sizes and market access. Backyard poultry offers moderate feasibility with low investment needs and SHG compatibility. Piggery, though profitable in tribal regions, has lower adoption and high unit costs. Commercial poultry has the lowest feasibility due to thin profit margins and high operational costs.
3. **Livestock Economics:** Dairying, despite high investment per animal, yields significant income, making it an attractive option for smallholders. Sheep and goat farming provide the highest average holding and favorable income-to-investment ratios. Backyard poultry is low-cost and scalable but yields modest returns. Commercial poultry, with the highest population but lowest number of farmers, shows minimal income margins, signaling the need for improved efficiency and support.
4. **Entrepreneurial Willingness:** Dairy and sheep/goat sectors have the highest entrepreneurial interest, including existing and prospective entrepreneurs. A considerable number are already engaged, especially in dairying. Interest in piggery and commercial poultry is lower, highlighting the need for targeted promotion and support.
5. **Food and Fodder:** Access to own fodder plots and MGNREGS support increases with landholding size. However, even farmers with up to 4 acres rely heavily on market procurement or external support. Most smallholders lack self-sufficient fodder systems, indicating a need for community fodder banks or targeted green fodder schemes.
6. **Livestock Population:** Dairying has the highest livestock population and farmer participation, followed by buffalo and cow farmers. While buffalo numbers surpass cows, cow farmers are more numerous, suggesting smaller average holdings and possibly different market or cultural preferences.
7. **Typology of Breeds:** Indigenous and non-descript breeds dominate livestock across all categories, particularly in sheep and goats. Graded and crossbred animals are more common in buffaloes and cows, respectively. This underscores the potential for genetic improvement programs and the need for breed-based productivity enhancement.
8. **Feed-Related Challenges:** High feed cost is the most common challenge across all livestock categories, followed by seasonal shortages and poor feed quality. Backyard poultry and commercial poultry also struggle with feed affordability. Green fodder access and knowledge of balanced feeding remain key gaps.
9. **Market Access Challenges:** Most livestock farmers face low and fluctuating prices, dependence on middlemen, and the absence of minimum support prices. These challenges are acute across all livestock categories, including poultry. Poor transport and cold storage further limit access to profitable markets.
10. **Critical Financial Challenges:** Buffalo and cow farmers report high incidences of loan disbursement delays, high-interest rates, and claims being denied for petty reasons. These issues are less prevalent but still present among small ruminant and poultry farmers. A large proportion reported no issues, which may reflect either satisfaction or low credit uptake.
11. **Support Required to Scale:** Healthcare and feed/fodder access are the top needs across all farmer categories, followed by insurance and credit. Market linkages and training are also important, particularly for smallholder poultry and piggery farmers. Buffalo and cow farmers express greater demand for breeding and technology support.

POLICY MESSAGES

1. **Expand insurance awareness and coverage to improve financial security and credit access**

   Livestock insurance remains underutilized in rural areas. Enhancing awareness, simplifying enrollment, and integrating insurance with digital platforms (like eRBKs) can protect farmers from losses due to disease, disasters, or death of animals—especially for cattle, buffalo, and small ruminants. A robust insurance ecosystem improves farmers' creditworthiness and encourages higher investment in livestock.

2. **Strengthen institutional credit systems, especially for smallholders and uninsured farmers**

   Credit access is a major constraint for small and marginal livestock keepers. Strengthening linkages with banks, improving KCC (Kisan Credit Card) uptake for livestock, and involving cooperative credit institutions can help bridge this gap. Special attention is needed for landless livestock owners who often remain excluded from formal finance.

3. **Improve feed affordability, quality, and storage, alongside community-level fodder solutions**

   Feed accounts for over 60% of livestock production costs. Promoting low-cost, nutritionally balanced feed blocks, community fodder banks, and silage units can help reduce feed costs and improve productivity. Community-based fodder cultivation on common lands can also support livestock during lean seasons and droughts.

4. **Ensure price stabilization through MSP or assured procurement mechanisms**

   Livestock producers, especially in dairy, meat, and wool sectors, often face price volatility. A system of Minimum Support Price (MSP) or assured procurement (via cooperatives, FPOs, or state agencies) can protect farmers from market crashes and incentivize higher-quality production. This is critical for income stability and sectoral confidence.

5. **Invest in infrastructure for transport, cold storage, and market access**

   Many farmers suffer post-harvest losses or low prices due to poor logistics. Investments in cold chains, rural processing units, milk chilling centers, mobile vet vans, and all-weather roads can vastly improve livestock product marketing. Improved infrastructure ensures better value realization and reduces spoilage.

6. **Promote genetic improvement and breed diversification through local breeding programs**

   Genetic potential is a key driver of productivity. Community-based breeding programs focusing on indigenous and cross-bred varieties—tailored to regional conditions—can improve milk yield, growth rates, and disease resistance. Breed diversification also helps reduce risks related to climate variability and market preferences.

7. **Develop targeted training and technology support, particularly for marginal and tribal farmers**

   Marginal and tribal farmers often lack access to updated knowledge and modern practices. Customized extension services, digital tools in local languages, and mobile-based advisory platforms can equip these communities with skills in animal health, nutrition, housing, and value addition.

8. **Encourage SHG-driven backyard poultry and small ruminant ventures with tailored support**

   Women's Self-Help Groups (SHGs) are ideal agents for scaling low-cost backyard poultry and goat/sheep rearing enterprises. Providing starter kits, access to chicks/goats, health services, and small credit can help build resilient, local enterprises that generate regular incomes and improve nutrition.

9. **Promote piggery in tribal regions through breed improvement and healthcare access**

   Piggery is a key livelihood in many tribal areas but suffers from poor breeds and high disease incidence. Introducing improved breeds, vaccination drives, and local veterinary outreach can significantly enhance productivity and incomes. Integration with feed and waste management also opens circular economy opportunities.

10. **Incentivize private sector involvement in commercial poultry modernization**

    Commercial poultry has high growth potential but requires modernization in biosecurity, processing, and export-readiness. Public-private partnerships (PPPs), capital subsidies, and fast-track clearances can encourage private investment in hatcheries, integrated poultry parks, and smart cold chains—creating jobs and expanding exports.

11. **Promote circular economy in livestock management**

Promote a decentralized, waste-to-wealth livestock economy that empowers smallholders and SHGs through scalable circular innovations—linking bioenergy, organic inputs, feed security, and green branding—to boost rural incomes, reduce emissions, and build climate resilience."

Strategic Action Matrix for Inclusive Livestock Sector Development in Andhra Pradesh

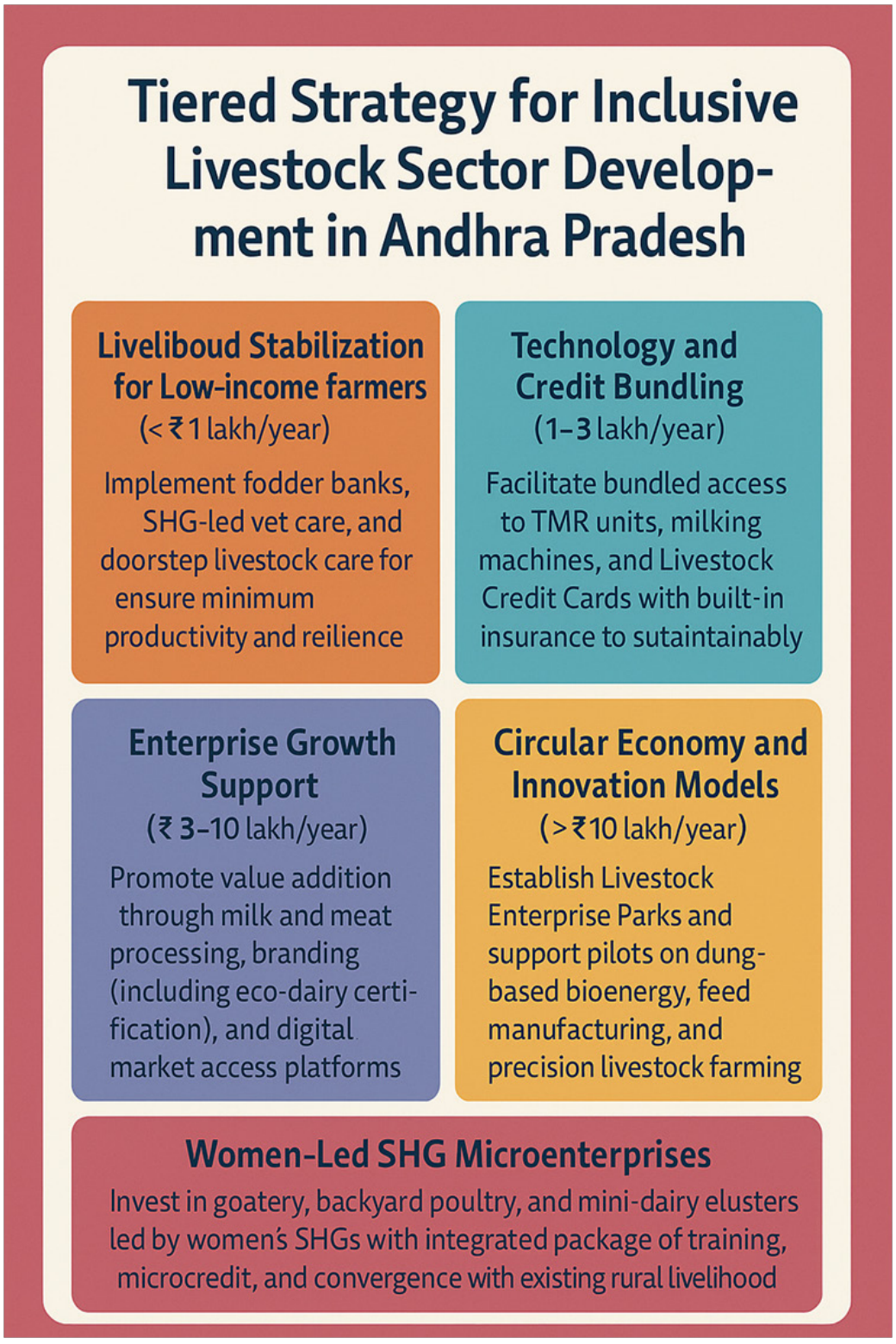
Actionable Focus Area	Target Segment	Strategic Approach
1. Entry-Level Livelihood Stabilization	Farmers earning < ₹1 lakh (26%)	- Establish subsidized fodder banks - Deploy *Pashu Sakhis* for doorstep services - SHG-led community veterinary and vaccination camps
2. Technology Adoption + Credit Bundling	Farmers earning ₹1–3 lakh (49%)	- Promote adoption of TMR units, milking machines, chaff cutters - Pasu Kisan Credit Cards (PKCC) - Bundle credit with insurance and extension
3. Enterprise Growth and Market Integration	Farmers earning ₹3–10 lakh (13%)	- Support for mini-processing units (ghee, curd, meat) - Enable eco-dairy and traceability certification - Facilitate market linkages and e-commerce
4. Circular Economy + Innovation Pilots	Farmers earning > ₹10 lakh (2%)	- Establish multi-enterprise livestock parks - Incubation for dung-to-energy, feed blocks, value-added by-products - Scale up AI, IoT, and precision livestock models
5. Women-Led Microenterprise Enablement	SHG Members in < ₹1 lakh group	- Promote dairy mini-units, backyard poultry, goatery - SHG capacity building and digital skilling - Converge with credit schemes and livelihood missions

A **tiered strategy** for Andhra Pradesh's livestock sector is critical to unlock its full economic potential while ensuring equity and sustainability. Based on farmer income levels and enterprise types, five actionable focus areas are proposed:

1. **Livelihood Stabilization for Low-Income Farmers (< Rs.1 lakh):** Prioritize subsidized fodder banks, SHG-led vet care, and doorstep services through Pashu Sakhis to improve basic productivity.
2. **Technology and Credit Bundling (Rs.1–3 lakh):** Enable access to TMR, milking machines, and introduce Livestock Credit Cards linked with insurance for mid-tier farmers to scale operations.
3. **Enterprise Growth (Rs.3–10 lakh):** Promote value addition through processing, branding, and market integration, including eco-dairy certification and digital platforms.
4. **Circular Economy Models (> Rs.10 lakh):** Establish livestock enterprise parks and innovation pilots around dung-based energy, feed production, and smart farming technologies.
5. **Women-Led SHG Microenterprises:** Focus on goatery, backyard poultry, and dairy clusters with training, credit, and convergence support.

This structured approach aligns investments with farmer capacity, enabling targeted, scalable, and inclusive rural transformation.

Call to Action: Andhra Pradesh has the potential to become a national leader in inclusive, sustainable livestock-based livelihoods. Strategic investments in fodder security, veterinary care, technology, and market ecosystems—backed by smart governance and convergence—can unlock incomes, nutrition, and employment at scale. A State-Level Livestock Mission with multi-departmental coordination is recommended to steer these reforms under the direct leadership of the Hon'ble Chief Minister.


Tiered Strategy for Inclusive Livestock Sector Development in Andhra Pradesh
Liveliboud Stabilization for Low-income farmers
(< ₹1 lakh/year)
Implement fodder banks, SHG-led vet care, and doorstep livestock care for ensure minimum productivity and reilience
Technology and Credit Bundling
(1–3 lakh/year)
Facilitate bundled access to TMR units, milking machines, and Livestock Credit Cards with built-in insurance to sutaintainably
Enterprise Growth Support
(₹ 3–10 lakh/year)
Promote value addition through milk and meat processing, branding (including eco-dairy certification), and digital market access platforms
Circular Economy and Innovation Models
(>₹10 lakh/year)
Establish Livestock Enterprise Parks and support pilots on dung-based bioenergy, feed manufacturing, and precision livestock farming
Women-Led SHG Microenterprises
Invest in goatery, backyard poultry, and mini-dairy elusters led by women's SHGs with integrated package of training, microcredit, and convergence with existing rural livelihood

ACKNOWLEDGEMENTS

We extend our heartfelt gratitude to the thousands of livestock farmers across Andhra Pradesh who generously shared their time, experiences, and insights for this study. Their voices are at the heart of this report. By opening their farms and lives to us, these progressive dairy, poultry, and small ruminant farmers have provided invaluable understanding into the evolving dynamics of livestock enterprises in the state.

Their willingness to engage in detailed conversations, despite their daily responsibilities, reflects a deep commitment to not only their own progress but also to the collective advancement of the sector. This report is a tribute to their resilience, innovation, and aspirations for a more sustainable, inclusive, and prosperous livestock future.

Department of Animal Husbandry, Government of Andhra Pradesh
&
Global Forum for Sustainable Development

ABOUT THE GLOBAL FORUM FOR SUSTAINABLE TRANSFORMATION (GFST)

The Global Forum for Sustainable Transformation (GFST) is an international think-and-do tank advancing inclusive development through data, innovation, and policy integration. Operating at the nexus of governance, community empowerment, and digital transformation, GFST leverages emerging technologies such as Artificial Intelligence (AI) and Machine Learning (ML) to design scalable solutions for sustainable livelihoods. By partnering with government departments and institutions, GFST enhances policy frameworks and implementation effectiveness across sectors including agriculture, education, health, and climate resilience. With a strong presence in India and growing global collaborations, GFST is shaping next-generation strategies for equitable and future-ready development.

Andhra Pradesh Chief Minister N. Chandrababu Naidu has put forth an inspiring vision for the state's development by 2047, underscoring the essential role of animal husbandry in driving economic growth and reducing poverty. This vision is embodied in the 'Swarna Andhra-2047' initiative, designed to transform Andhra Pradesh into a prosperous and self-reliant state.

Role of Animal Husbandry in Vision 2047: Animal husbandry is positioned as a dynamic sector for creating jobs and fostering rural development. By focusing on enhancing productivity, encouraging entrepreneurship, and embracing modern technologies, this sector can make a meaningful contribution to the state's economic goals and poverty alleviation efforts, paving the way for a brighter future.

Through these strategic initiatives, Andhra Pradesh is poised to achieve a future where economic prosperity and social equity thrive together. With its transformative potential, animal husbandry stands as a foundational element of this journey, inspiring hope and opening up new possibilities for all.

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