ACTION BRIEF

Large Livestock Systems for Agroecological Integration: Strengthening Agroecological Livelihoods through Improved Livestock Assets and Local Animal Health Ecosystems

SCALAGRO Project (Phase 1) - Andhra Pradesh & Telangana, India

Qualitative Multi-Stakeholder Study | 2024–2025

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Intervention	Location	Phase	Period
Large Livestock Support	Zaheerabad cluster, Telangana	SCALAGRO India - Phase 1	2024-2026
75:25	**1**	**25%:75%**	**₹ 3,000**
Co-Investment Ratio	Village Targeted	Oxen: Buffalo/cow Ratio	Oxen Hire Rate/Day

1. Scientific Rationale: Livestock as Ecological Infrastructure

Within agroecological systems theory, livestock are not an additive income stream appended to crop farming; they constitute a functional ecological subsystem whose integration transforms a linear, extractive cropping system into a cyclical, self-reinforcing agroecosystem (Altieri, 1995). Bovine manure and urine serve as primary organic amendments for soil biological restoration and as the principal substrates for Jeevamrutam and related microbial preparations central to natural farming practice. Draught animals provide low-cost traction services on small landholdings where mechanisation is economically prohibitive. Milk constitutes a nutritionally dense, rapidly accessible household food security asset. The systemic value of a single productive animal to a smallholder farming household, therefore, substantially exceeds its market price when these ecological service functions for soil amendment provision, traction, and nutrition are monetised alongside direct milk or meat income.

The progressive decline of livestock populations across the study region over the preceding three decades constitutes a well-documented ecological and economic crisis. Commercial crop expansion, particularly cotton, whose cultivation was actively promoted by seed companies from Andhra Pradesh approximately twenty years prior to this study displaced fodder-yielding crops and reduced access to common grazing lands. Rising agricultural wage rates made animal husbandry labour increasingly costly relative to expected returns. The disaggregation of joint family structures, associated with government-supported residential schooling and seasonal male out-migration, removed the distributed household labour that had historically enabled large ruminant maintenance. The net consequence has been a decline in on-farm organic matter inputs, an escalation of synthetic fertiliser dependency, a decline in soil microbial biomass, and the progressive erosion of traditional livestock-integrated farming knowledge, which is difficult to recover once lost from a community.

2. Intervention Design

The SCALAGRO large livestock intervention operates through a co-investment financing model on a 75:25 cost-sharing basis: the project contributes 75% of the animal procurement cost through a low-interest revolving loan, and the beneficiary household contributes the remaining 25% as a stake that signals commitment and discourages speculative participation. Household selection was conducted through a participatory process facilitated by local women's Sangam groups, applying criteria of adequate shelter space, access to fodder resources (own land or reliable common grazing access), demonstrated interest in natural farming, and priority allocation to women-headed and economically marginalised households.

All programme animals are registered with the local government livestock authority and enrolled in the state's livestock disaster insurance scheme, providing financial protection against mortality from

disease, flood, or drought. A mandatory training programme covers ethno-veterinary practice, modern vaccination protocols, balanced seasonal nutrition, including region-specific mineral mixture supplementation, and organic manure management for natural farming amendment production. Technical backstop is provided through the KVK's (Krishi Vignan Kendra) animal husbandry subject matter specialist on a continuous basis.

The revolving fund architecture is the financial engine of the model's sustainability: repayments made by beneficiary households are deposited into a pooled community capital fund managed by the Sangam, which finances successive cohorts of animal distribution to new beneficiaries. A one-time project investment thereby becomes a self-perpetuating community asset base that expands without requiring proportional continued external funding.

Cattle distributed at Meriampur village, Zaheerabad and Discussion with Beneficiaries

3. Cost-Benefit Analysi

3.1 Large Ruminants: Cattle vs. Buffalo Comparative Economics

Writeshop deliberations produced detailed community-validated economic profiles for cattle and buffalo under study region conditions. The optimal species choice is determined by locality-specific variables, including proximity to urban milk markets, fodder availability, household labour capacity, and the presence of irrigation infrastructure. Table 1 presents a comparative analysis of annual economic costs.

"In all Thandas (hamlets), good livestock was traditionally maintained. Over the last three decades, livestock numbers have significantly reduced. Livestock is important because it improves household food consumption, provides nutritional benefits, and its manure supports soil fertility and farming activities." — Community discussion, SCALAGRO Writeshop, DDS-KVK Zaheerabad, February 2026

Parameter	Cattle - Desi/Jersey Cross (₹)	Buffalo (₹)
Procurement cost (estimated)	28,000-40,000	45,000-60,000
Beneficiary contribution (25% co-investment)	7,000-10,000	11,250-15,000
Project loan contribution (75%)	21,000-30,000	33,750-45,000
Milk yield (litres/day; months productive/year)	5-12 L/day; 8-10 months	8-16 L/day; 8 months
Annual milk income (₹ 40-50/L × 240 productive days)	48,000-72,000	77,000-92,800
Manure yield (kg/day × 300 days/ year)	10-15 kg; ₹ 3,000-4,500	18-25 kg; ₹ 5,400-7,500
Manure premium value for BRC/ natural farming (₹ 2/kg)	6,000-9,000	10,800-15,000
Traction / hire income (oxen; 20 days/month × 6 months × ₹ 3,000)	~36,000	N/A - not used for traction
Annual gross income (milk + manure + traction)	90,000-1,17,000	87,800-1,07,800
Annual maintenance (feed supplement, mineral mixture, vet)	12,000-18,000	18,000-25,000
Annual net income before loan repayment	72,000-99,000	69,800-82,800
Annual loan repayment (5-year term, 1% interest)	~5,000-7,000	~8,000-10,000
NET ANNUAL INCOME AFTER REPAYMENT	~65,000-92,000	~60,000-72,000

Table 1. Comparative annual economic analysis: Desi/Jersey cattle vs. buffalo under study region conditions, Telangana, 2025–2026.

3.2 Goat Rearing: Economics for Single Women and Marginalised Households

Goat rearing was identified during the writeshop deliberations as the most appropriate large ruminant intervention for single-woman and women-headed households, owing to substantially lower capital requirements, smaller housing infrastructure needs, and the species' capacity to subsist on low-quality browse and crop residues that would otherwise be unutilised. Osmanabadi and Boer breeds, sourced from Narayankhed and Mailaram weekly markets, were selected for their documented productivity and adaptability under semi-arid Telangana conditions. Table 2 presents the economics of the minimum viable unit.

Parameter	Value (₹ unless stated)	Notes
Unit: 1 male + 1 female (Osmanabadi or Boer breed)	Procurement: ₹ 10,000-15,000	Per 2-goat unit
Parturition rate: kids born per doe per 6-month cycle	2 kids per cycle (typical)	Documented rate
Kid market value at 9 months post-weaning	~₹ 15,000 per kid	Narayankhed market
Annual income from kid sales (2 kidding cycles)	~₹ 60,000	Optimistic scenario
Manure yield: ~3 quintals per animal per year	Value: ~₹ 600/quintal = ₹ 1,800 per animal	Annual estimate
Total manure income (2 animals)	~₹ 3,600	Annual
ANNUAL GROSS INCOME (2-goat unit)	~₹ 63,600	Kids + manure
Annual feed, health, and maintenance costs	~₹ 8,000-12,000	Low-input system
NET ANNUAL INCOME (2-goat unit)	~₹ 51,600-55,600	After all costs
Goat Bank: One goat returned to the fund after 2 years	Enables the next beneficiary	Revolving model

Table 2. Economic analysis: minimum viable goat rearing unit (2 animals), targeted at single-woman and women-headed households.

Key Finding -Large Livestock Cost-BenefitA productive cattle or buffalo unit generates an estimated net annual income of ₹ 60,000-92,000 after maintenance costs and loan repayment, with manure contributing an additional ₹ 6,000-15,000 in value to the household's natural farming system annually. A two-goat unit targeted at single women generates approximately ₹ 51,600-55,600 net annual income, representing a transformative livelihood addition for the most economically marginalised households. Manure produced by all programme animals collectively constitutes the organic substrate base for the BRC (Bio-input Resource Centre) and natural farming value chains, generating a systemic ecological multiplier effect beyond household-level financial returns alone.

4. Ecological Synergy: The Livestock–BRC–Crop Nexus

The most important insight to emerge from writeshop deliberations on the livestock pilot is the recognition that cattle, goat, and poultry rearing are not independent livelihood activities but functionally interdependent components of an integrated agroecological system whose combined ecological outputs exceed the sum of their individual parts. This nexus operates through three linked cycles.

First, livestock manure and urine, when processed through the BRC's biological inoculant production system, yield microbially enriched soil amendments that enhance soil organic carbon, water retention capacity, and plant-available nutrient concentrations. Second, improved soil biological function reduces crop susceptibility to pest and disease pressure, decreasing the demand frequency for biopesticide applications and lowering associated production costs. Third, improved crop yields generate increased volumes of crop residue and stover, which re-enter the fodder cycle as supplementary livestock feed, sustaining animal nutritional status and closing the ecological loop without external input.

This circular logic carries a direct programme design implication: BRC establishment and livestock distribution must be treated as complementary, co-dependent investments, implemented in a coordinated sequence within each village cluster. A farm household with BRC access but no livestock lacks the manure substrate for Jeevamrutam preparation; a household with livestock but no BRC access cannot convert that manure into standardised biological inputs for broad-scale application. The integration of these pilots is therefore a functional necessity of the agroecological system design, not merely a programme preference.

5. Location-Specific Livestock Suitability

Writeshop participants underscored that uniform livestock distribution models lead to ecological and economic inefficiencies. Animal species, breed, and scale must be calibrated to local fodder availability, water access, proximity to markets, and existing community husbandry knowledge. Table 3 presents the location-specific suitability framework developed through community-informed deliberation.

Settlement / Community Type	Recommended Livestock Focus and Rationale
Peri-urban villages with reliable irrigation	Buffalo-based commercial dairy; milk collection centres (300 L/day) managed by unemployed youth; proximity to urban markets enables competitive milk pricing and regular income.
Thandas (tribal hamlets, remote semi-arid)	Indigenous and Jersey-cross cattle; low-input maintenance aligned with available browse and crop residue fodder; ghee production for household consumption and local sale.
Yadav community settlements	Goat rearing revitalisation using improved Boer and Osmanabadi breeds; residual community husbandry knowledge reduces training investment and adoption barriers.
Ibrahimpur and similar rain-fed villages	Goat rearing is already culturally embedded and ecologically suited; strengthen existing practice through improved breed access and veterinary support rather than introducing unfamiliar species.
All settlements -baseline intervention	Backyard poultry (25 indigenous hens) for all women-headed and single-woman households; the lowest-risk entry point for animal husbandry with immediate household nutritional benefit.

Table 3. Location-specific livestock suitability framework across settlement types in the study region.

6. Constraints and Risk Mitigation

Animal mortality from disease, drought, or predation represents the primary financial risk of the large livestock programme: the loss of a productive animal is a catastrophic economic event for a household that has invested months of financial resources, labour, and care. Mandatory government livestock registration and insurance enrolment at programme entry are the primary risk-mitigation tools,

providing financial compensation in defined loss scenarios. The ethno-veterinary and vaccination training programme builds household capacity for early disease detection and first-response management, reducing preventable mortality. Region-specific mineral mixture supplementation addresses a specific documented vulnerability: trace element deficiencies in the study region's mineral-poor soils compromise livestock immune function and reproductive performance.

Seasonal fodder scarcity during the March-to-July lean period represents a structural ecological risk for households with limited cultivable land. Community fodder banks, collectively managed stores of dried crop residues coordinated through Sangam structures, were endorsed by the writeshop as a community-level insurance mechanism against this seasonal constraint. In forest-adjacent villages, the systematic harvest of tree leaf fodder from Azadirachta indica, Sesbania sesban, and local Acacia species constitutes a complementary, near-zero-cost resource that has declined in practice and can be revived through community knowledge-sharing.

Agroecological Principles Addressed *Recycling • Input Reduction • Soil Health • Animal Health • Synergy • Economic Diversification • Social Values and Diets*

7. Recommendations

1. Operationalise the 75:25 co-investment model across 10 identified villages (1 animal unit per family) and complete government livestock registration and insurance enrolment for all programme animals before distribution.
2. Prioritise goat distribution to single-woman and women-headed households through the DDS Goat Bank model; establish a formal goat bank fund accounting managed by women's Sangam with quarterly DDS oversight.
3. Establish at least one milk collection centre per five-village cluster (with a 300-litre daily capacity), managed by unemployed youth with institutional credit access through Rang De or cooperative bank partnerships.
4. Implement community fodder banks managed through Sangam structures in each village cluster to provide lean-season fodder security for programme livestock and reduce seasonal income vulnerability.
5. Coordinate livestock distribution timing with BRC establishment within each village cluster to ensure manure substrate availability for Jeevamrutam production from the first agricultural season.

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About the SCALAGRO Project

SCALAGRO (Scaling Agroecology) is a collaborative international research project operating across India, Bolivia, and Burkina Faso. In India, the project is implemented in partnership with the Centre for Sustainable Agriculture (CSA). Phase 1 focused on baseline qualitative research to understand existing agroecological knowledge systems and the structural conditions shaping transitions.

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