Original Research Article

Socio-Economic Impact of Technological Interventions on Sheep Farming Productivity

ABSTRACT

AIMS: The study aimed to assess the impact of technological interventions on sheep farming productivity and farmer livelihoods in Krishnagiri district, Tamil Nadu. The primary objectives were to address key constraints such as inbreeding, poor nutrition, low birth weights, high lamb mortality, and inefficient marketing practices.

METHODOLOGY: A benchmark survey of 200 sheep farmers was conducted to identify production challenges. Fifty farmers were selected for targeted interventions, prioritizing women and marginalized groups. The interventions included introducing improved rams to reduce inbreeding, strategic supplementary feeding during flushing, pregnancy, and lactation, hydroponic fodder and Azolla supplementation, ethno-veterinary first aid training, and improved marketing strategies. Farmers underwent training, and the impact was assessed through productivity and economic indicators.

KEY FINDINGS AND DISCUSSION: The interventions significantly improved reproductive efficiency and lamb growth. Conception rates increased from 50–60% to over 80%, while prenatal nutritional support enhanced birth weight and weaning weight by over 20%. Lactation-phase supplementation led to a 15% increase in postnatal lamb growth. Farmers observed a reduction in lamb mortality and faster weight gain, enabling earlier market sales. The introduction of improved rams and better nutrition resulted in increased meat yield and profitability. Ethno-veterinary practices improved flock health, and training enhanced marketing efficiency. Farmers reported higher incomes, selling more animals per cycle and reducing rearing costs.

CONCLUSION: Strategic technological interventions significantly enhanced sheep farming productivity and farmer income. Improved breeding, nutrition, and health management practices resulted in better reproductive efficiency, lamb survival, and economic gains. The study highlights the importance of integrating scientific innovations into traditional sheep farming systems for long-term sustainability and rural development.

Keywords: *Socio-economic analysis, Technological interventions, Sheep productivity, Rural livelihoods, Smallholder farmers.*

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1.0 INTRODUCTION

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Krishnagiri district in Tamil Nadu is home to approximately 2,30,527 sheep, with the highest population density (61-70 heads per sq. km) observed in Krishnagiri, Bargur, Vepanahalli, and Soolagiri blocks. Sheep farming in the region is predominantly managed by small and marginal farmers, who rely on extensive grazing systems to sustain their livestock. Despite the availability of 7,853 hectares of pasture and grazing land, these resources are insufficient to support grazing throughout the year, particularly during the lean season, when poor forage availability and low-quality grazing material significantly impact animal growth rates. This often results in distress sales, reducing the profitability of sheep farming (Chinnathambi et al., 2025).

Traditional rearing methods, which include free-range grazing and minimal veterinary intervention, often contribute to low productivity levels due to challenges such as nutritional deficiencies, disease outbreaks, high lamb mortality, and suboptimal breeding practices. The lack of awareness and access to scientific sheep farming technologies further limits productivity and profitability in this sector (Ajafar et al, 2022).

Recognizing these constraints, the National Bank for Agriculture and Rural Development (NABARD) sponsored a project through the Veterinary University Training & Research Centre, Krishnagiri (Tamil Nadu Veterinary and Animal Sciences University - TANUVAS) to analyze and improve sheep farming practices in the region. The key objectives of this study were to:

1. Identify major constraints in extensive sheep farming under field conditions and evaluate how the adoption of scientific interventions can enhance sheep productivity and farmers' economic well-being.
2. Implement farmer-friendly technological interventions in extensive sheep farming to improve growth rate, reproductive efficiency, and disease resistance, thereby enhancing overall productivity.
3. Document the impact of these interventions on sheep productivity, health, and farmers' income levels, ensuring measurable improvements.
4. Disseminate knowledge by demonstrating successful interventions and their outcomes to other sheep farmers, promoting widespread adoption.
5. Assess the economic benefits of technological interventions on the livelihoods of sheep farmers, particularly small and marginal farmers, and recommend policy measures for sustainable growth.

Through this study, the project aimed to bridge the gap between traditional sheep farming practices and modern scientific approaches, thereby improving flock performance, reducing economic losses, and enhancing the socio-economic conditions of sheep farmers in Krishnagiri district.

2.0 METHODOLOGY

The study was conducted in Krishnagiri district, Tamil Nadu, covering 200 sheep farmers. The selection criteria included flock size, farming experience, and willingness to adopt new technologies. A mixed-methods approach was employed, integrating quantitative and qualitative research techniques. Data collection involved structured interviews to gather demographic and economic information, farm observations to assess existing management practices, and participatory rural appraisals to understand farmers' perceptions and challenges. Additionally, baseline and post-intervention assessments were conducted to measure the impact of technological interventions on productivity and economic gains.

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3.0 KEY FINDINGS AND DISCUSSION

3.1 Benchmark survey

We conducted a benchmark survey in the field, covering 200 sheep farmers, to assess their existing farming practices, constraints, and socio-economic conditions. The collected data were systematically analyzed, and the consolidated results are presented in the following table:

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Table 1: Benchmark survey

1.	Number of sheep maintained	Ewes average = 28-35 Rams = 2 - 3
2.	Breed	Mecheri
3.	Land Holding	Mostly landless
4.	Housing of sheep	Folded in Patti
5.	Night Folding done in Agricultural land	Its seasonal variation like during agricultural harvesting period.
6.	Regular Feeding	Only Grazing
7.	Duration of Grazing available in Year (Months)	5 - 6 months
8.	Where the Animals are Grazed	Village grazing land
9.	Problems in Grazing (Rank)	Only few months

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10.	Any supplement Given after Grazing	No
11.	Do you cultivate and feed green grass	No
12.	Mating season (specify month)	Seasonal breeds
13.	Any supplement before mating	No
14.	No. of Breeding Rams in flock	Average 2 — 3 Rams
15.	No. of Breedable Ewes in Flock	Average 15-3.8
16.	Age at sexual maturity in female	Not known
17.	Body weight at the time of first mating	Not known
18.	Tupping %	Not known
19.	Percentage of twins in flock	Very less
20.	Quantity milk consumed by lambs	Not known
21.	Are your Rams used for Breeding born in your flock itself	Yes (Most of the farmers)
22.	How long you use the same Ram for Breeding?	Years together
23.	Where from you buy your Rams?	Own Farm
24.	Grazing both your Rams and Ewes together	Yes (Most of the farmers)
25.	Do you feed supplement in Pregnancy	No
26.	Approximate birth weight of Lambs	Not known
27.	Percentage of pre weaning lamb mortality	18-20%
28.	Do you feed supplement to lactating Ewes	No
29.	Percentage of survival of lambs at weaning	No Record
30.	App. Weight of lambs at weaning	7.05 Kg.
31.	Body weight of Ewes	Above 36 Months -28.39 Kg
		24 to 36 months-6 Teeth-28.65 Kg
		12 months — 19.32 kg
		9 Months — 14.29 kg
32.	Do you know about Azolla and its feeding	No
33.	No. of animals sold/ year	5 — 7 Lambs
34.	Place of selling animals	Shandy
35.	Have you visited any Government/ private sheep farm in the last 5 years	No
36.	Have you under gone any training	No
37.	Approximate annual income	Not known

The majority of farmers rear Mecheri sheep under an extensive system with minimal technological interventions. Flock sizes typically range from 28 to 35 ewes with 2 to 3 rams, and inbreeding is common due to the continuous use of farm-born rams without replacement. Grazing is the primary source of nutrition, but its availability is limited to about six months per year, leading to severe feed shortages during lean periods. No supplementary feeding is practiced, and farmers lack awareness of nutritional interventions

such as green fodder cultivation and alternative feed resources like Azolla. Breeding management is unstructured, with no strategic supplementation before mating, resulting in low twin birth rates and reduced reproductive efficiency. High pre-weaning lamb mortality (18-20%) is observed, likely due to inadequate colostrum intake, disease prevalence, and poor nutrition. Housing facilities are temporary, and night folding is practiced on agricultural lands depending on seasonal availability. Marketing is primarily done through local shandies, with farmers selling around 5 to 7 lambs annually, but financial record-keeping is absent, making it difficult to assess profitability. Additionally, no farmers have attended training programs or exposure visits to improve their farming knowledge.

Fig 1 : Mecheri sheep under an extensive system

fig 2 : Awarness programme

From the above findings, it is evident that immediate interventions are necessary. We have identified key technological interventions that can be implemented to improve sheep productivity and profitability, ultimately enhancing farmers' livelihoods by addressing the following issues:

3.2 Technological Interventions needs to implemented

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3.2.1 Inbreeding:

Farmers commonly practiced breeding within the same flock due to limited access to quality breeding rams. This led to a decline in genetic diversity, resulting in reduced growth rates, lower fertility, and higher susceptibility to diseases.

3.2.2 Poor Nutrition During Critical Periods:

Sheep experienced nutritional deficiencies, particularly during the dry season when natural grazing resources were scarce. The lack of supplementary feeding during gestation and lactation phases further contributed to poor reproductive performance and weak lambs.

3.2.3 Low Birth Weight and Weaning Weight of Lambs:

Due to inadequate maternal nutrition and genetic limitations, lambs were born with lower birth weights. This significantly affected their survival and growth rates, ultimately impacting the overall productivity of the flock.

3.2.4 High Lamb Mortality:

The mortality rate among lambs was alarmingly high, primarily due to inadequate colostrum intake, disease prevalence, and poor housing conditions. Limited awareness of disease prevention and lack of vaccination further aggravated the issue.

3.2.5 Reduced Feed Efficiency in Male Lambs Grown for Meat Production:

Male lambs, reared for meat production, exhibited poor feed conversion efficiency due to substandard nutrition and genetic factors. This resulted in extended rearing periods and lower profitability for farmers.

3.2.6 Poor Marketing Ability Among Sheep Keepers:

Most farmers lacked access to organized markets and were dependent on local traders who offered lower

prices for their animals. The absence of collective bargaining power and market intelligence further restricted their ability to obtain fair prices, limiting their income potential.

3.3 Technological Interventions

The following key technological interventions have been carried out to alleviate the above field constraints in sheep farming under rural conditions.

3.3.1 Beneficiaries

A total of 25 sheep keepers, each possessing a minimum of 20-25 sheep, were enrolled each year for two consecutive years. Priority was given to women, with 10 beneficiaries from SC/ST communities out of the total 50 selected participants.

3.3.2 Training Program

A two-day training program was conducted for the beneficiaries on the following transferable technologies:

- Introduction of improved rams (breedable males) for genetic improvement and to prevent inbreeding.
- Supplementary feeding during critical periods such as flushing, advanced pregnancy, and lactation in ewes.
- Production and feeding of hydroponic fodder to lambs and Azolla to growers as supplements.
- Stimulating the oesophageal groove in pre-weaned lambs for effective feeding.
- Defaunation of the rumen to increase feed efficiency.
- Feeding groundnut oil cake to weaned kids.
- Ethnoveterinary first-aid practices to reduce sheep mortality.

Fig 3,4 : Training Program

3.3.3 Introduction of Improved Rams for Genetic Enhancement

Each enrolled beneficiary received a high-quality breedable ram purchased from reputed sheep breeders. To prevent accidental mating, the existing rams with the beneficiaries were either castrated or sold to cover

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their contribution toward purchasing improved rams. Regular deworming of the entire flock was ensured.

Fig 5,6 : Improved Rams for Genetic Enhancement


3.3.4 Concentrate Feed Supplementation During Flushing Period

Approximately 20 days before mating, ewes were supplemented with 100g of concentrate feed per day. The tupping rate and conception percentage were monitored and recorded.

3.3.5 Concentrate Feed Supplementation During Late Pregnancy

Pregnant ewes, during the last 60 days of gestation, were fed 100g of concentrate feed per day as a supplement. The birth weight of lambs was recorded to assess the impact.

3.3.6 Supplementation During Lactation

Lactating ewes were provided with 100g of concentrate feed per day during the first 60 days of lactation, especially during the lean season. The body weight of lambs was measured at 60 days to evaluate growth performance.

3.3.7 Production and Feeding of Azolla as a Supplement

Beneficiaries were provided with necessary inputs, including polythene sheets and Azolla seed material. Adult sheep were regularly supplemented with Azolla to improve nutrition and overall health.

Fig 7,8: Production and Feeding of Azolla as a Supplement


3.3.8 Ethno-Veterinary First Aid Practices

Under this intervention, NABARD beneficiaries were trained in the use of locally available plant sources for first-aid treatment in sheep management. The training focused on addressing common health issues such

as diarrhea control, ectoparasite management, and indigestion problems.

3.3.9 Exposure Visit to Mecheri Sheep Research Station (MSRS), Pottaneri

The enrolled farmers were taken to the government-run Mecheri Sheep Research Station (MSRS) in Mecheri Taluk, Salem District. At the farm, scientists provided insights into various aspects of sheep management for profitable farming, emphasizing the role of novel technologies in improving productivity and doubling farmers' income. The sheep farmers actively participated in discussions and visited different sections of the farm, including various rearing systems, feeding patterns, breeding techniques, and herbal gardens.

Fig 9,10 Exposure Visit to Mecheri Sheep Research Station (MSRS), Pottaneri

3.3.0 Rural Workshop for Knowledge Dissemination

Upon completion of the intervention program, a rural workshop was organized where first-year beneficiaries shared their experiences regarding technology adoption and its impact. They discussed the effectiveness of each intervention and recommended viable technologies for wider implementation. Over two years, a total of 100 sheep keepers from the district benefited from the program.

3.4 Impact of Technological Interventions on Sheep Farming

The implementation of these technological interventions brought significant benefits to sheep farmers in the following ways:

3.4.1 Reduction in Inbreeding – The introduction of improved male germplasm helped reduce the risk of inbreeding within sheep flocks. This genetic management strategy led to healthier, more productive animals and minimized the adverse effects of inbreeding depression—a concern in smallholder systems with limited breeding stock. Although direct studies on Indian sheep populations are limited, practices that ensure genetic diversity are vital for sustainable flock productivity (Ravimurugan et al., 2022; Ajafar et al., 2022).

3.4.2 Enhanced Nutrition for Ewes – Balanced nutritional supplementation during flushing, late pregnancy, and lactation improved the health of ewes and the survivability of lambs. Better nutrition directly influenced lamb birth weight and weaning weight, aligning with findings from Indian livestock feeding strategies that emphasize stage-specific rationing (Tiwari et al., 2012).

3.4.3 Azolla Supplementation for Fodder Scarcity – During lean summer months, Azolla pinnata served as a crucial nutritional supplement. Azolla is rich in protein, minerals, and amino acids, making it a highly effective substitute for conventional fodder. Ahmed et al. (2016) demonstrated that Azolla could replace traditional feeds in sheep without negatively affecting growth performance. Additionally, Sankar et al. (2020) reported enhanced feed conversion efficiency and daily weight gain in sheep when Azolla meal was used as a dietary supplement. These findings underscore Azolla's utility in managing fodder scarcity and improving small ruminant productivity.

3.4.4 Reduced Early-Stage Lamb Mortality – Introducing feeding techniques such as oesophageal groove

feeding significantly reduced early lamb mortality. Ensuring adequate milk or milk replacer consumption in the first weeks of life enhances survival—a fact well-supported by lamb-rearing practices across arid Indian regions (Kumar et al., 2017)

3.4.5 Improved Growth Rate in Weaned Lambs – Supplementation of groundnut oil cake improved early body weight gain in weaned lambs, directly increasing their market value. Oilseed cakes are widely used in India to enhance protein intake, and studies have shown that groundnut cake is especially effective in boosting growth performance in small ruminants (Kumar et al., 2021).

Fig 11,12: Improved Growth Rate in Weaned Lambs

3.4.6 Ethno-Veterinary First Aid Practices – Workshop on ethno-veterinary medicine empowered farmers with locally adaptable, plant-based remedies. Meena et al. (2021) documented these practices among the Raika pastoralists of Rajasthan, highlighting their practical efficacy in addressing common ailments in sheep and goats. By integrating traditional knowledge with modern awareness, farmers were better equipped to provide timely and cost-effective first aid.

3.4.7 Improved Marketing Skills – Skill-building workshops on sheep marketing equipped farmers with the tools to better understand market dynamics, negotiate prices, and plan sale timing. Although detailed Indian studies on sheep marketing are still emerging, extension-driven marketing interventions have proven effective in similar livestock systems across India (Sasidhar et al., 2013).

3.5 Impact of Technological Interventions in Percentage Terms

The adoption of technological interventions led to measurable improvements in various aspects of sheep farming, as outlined below:

3.5.1 Reduction in Inbreeding – The introduction of new, genetically superior male sheep significantly reduced inbreeding, improving female acceptance and overall reproductive success.

3.5.2 Higher Reproductive Efficiency – Over 80% of ewes conceived, compared to the previous rate of 50–60%, indicating a substantial improvement in fertility.

3.5.3 Better Pregnancy and Delivery Rates – Prenatal growth rate of foetuses improved, leading to more than 90% confirmed pregnancies and successful deliveries, compared to 60–70% earlier.

3.5.4 Increased Birth and Weaning Weights – Lambs showed a more than 20% increase in birth weight and weaning weight, contributing to better survival rates and growth performance.

3.5.5 Improved Milk Secretion in Ewes – Supplemental feeding during lactation resulted in a 15% increase in postnatal growth of lambs, due to enhanced milk production in ewes.

3.5.6 Economic Benefits for Sheep Farmers – The socio-economic status of sheep farmers improved significantly, with higher revenues than in previous years. Farmers who earlier sold 5–6 male lambs at 9 months of age were now able to sell 7–8 male lambs every 6 months, thereby increasing their income and

reducing the rearing period.

3.5.7 Overall Productivity Gains – The combined impact of improved conception rates, higher lambing rates, reduced lamb mortality, and increased weight gain resulted in a higher quantity of quality meat production, benefiting both farmers and consumers.

The consolidated impact of this project / intervention were tabulated as follows:

Table 2: Summary of the consolidated impact of the project:

Parameter	Before Intervention	After Intervention	Impact
Lamb Birth Weight	2.0 – 2.2 kg	2.8 – 3.0 kg	Increased by 0.8 – 1.0 kg due to genetic improvement and better nutrition
Lamb Growth Rate	15 kg at 9 months	15 kg at 6 months	Faster growth rate, reducing rearing time by 3 months
Market Price of Sheep	Rs. 3,500 per animal	Rs. 4,500 – 5,000 per animal	Increased by 30% due to healthier and heavier lambs
Twin Births in Ewes	Rare or absent	5 out of 9 ewes gave twins	Increased fertility due to improved feeding strategies
Feed Cost Reduction	Higher due to reliance on commercial feed	15 – 25% lower	Adoption of Azolla and unconventional fodder reduced expenses
Use of Concentrate Feed	Minimal or absent	100 – 150 gm per animal/day	Improved nutrition for pregnant and lactating ewes
Maturity and Breeding Efficiency	Longer time to reach mating weight	Reduced maturity period	Increased mating frequency and overall reproductive efficiency
Mortality Rate of Lambs	Higher due to poor nutrition	Reduced significantly	Better survival rate with enhanced maternal nutrition
Overall Income Increase	Baseline	25 – 30% higher	Due to better flock management, growth rate, and market value

This table systematically summarizes the key improvements observed through the NABARD intervention, demonstrating its success in improving sheep productivity and farmers' livelihoods. Let me know if you need any modifications!

3.6 Cost-Benefit Ratio of Individual Farmers

The lamb growth rate significantly improved as their mothers were provided with concentrate feed for increased milk production for 60 days post-delivery at a rate of 100 grams per day (fully subsidized by NABARD). As a result, the lambs were healthier, had a noticeable glow, and exhibited better body weight compared to pre-intervention conditions.

Additionally, the weight gain of lambs accelerated, with farmers previously achieving a body weight of 15 kg only at around 9 months of age. Following the intervention, the same weight was attained within just 6 months, owing to the supplementary feeding of lactating ewes.

The sale of male lambs also generated higher revenue, with prices ranging from Rs. 250 to Rs. 300 per kg of live body weight (average market rate at the local level), due to their improved health and appearance. Since participating in the project, farmers have sold 20 sheep at Rs. 4,500 per animal, yielding significant profits while also saving three months' worth of rearing costs.

These interventions are expected to yield even better results over time. Farmers expressed high levels of satisfaction and have begun actively disseminating their success stories, sharing the benefits of the project with other sheep farmers in nearby villages.

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4. CONCLUSION

The implementation of targeted technological interventions in sheep farming in Krishnagiri district has demonstrated significant improvements in reproductive efficiency, lamb growth rates, and the economic well-being of small and marginal farmers. The introduction of improved breedable males effectively reduced inbreeding, while strategic supplemental feeding during critical physiological stages enhanced birth weights and weaning weights. The adoption of Azolla supplementation addressed seasonal fodder shortages, improving overall nutrition and productivity. Additionally, training on ethno-veterinary practices and marketing strategies empowered farmers to manage health issues efficiently and optimize their revenue.

Quantifiable benefits include an over 80% conception rate (compared to 50–60% before), a more than 20% increase in lamb birth and weaning weights, and a 15% improvement in postnatal lamb growth due to enhanced milk production in ewes. Farmers also reported an increase in the number of male lambs sold per cycle, significantly boosting their income. The improved management practices led to a notable reduction in lamb mortality, increased feed efficiency, and a higher quality of meat production.

These findings emphasize the potential of scientific interventions to bridge the gap between traditional and modern sheep farming methods. Widespread adoption of such practices, supported by training and financial assistance, can lead to sustainable growth in the sector, ensuring better productivity, profitability, and livelihoods for sheep farmers in resource-limited regions.

5. SUCCESS STORIES

The implementation of the NABARD-sponsored scheme, Technical Interventions for Improving Productivity of Sheep, has significantly benefited sheep farmers in Krishnagiri district by enhancing their flock productivity and economic returns. Mr. C. Ramachandran of Kurinapalli village, who previously sold sheep at Rs. 3,500 per animal at nine months of age, adopted scientific feeding practices, including concentrate feed and quality ram introduction. As a result, lamb birth weights increased from 2 kg to 3 kg, and their growth rate improved, reaching 15 kg in six months instead of nine. His income rose by 30%, with improved market prices for his sheep. Similarly, Mrs. Rani of Chinnagudoor Village, struggling with poor weight gain in her flock due to arid conditions, benefited from concentrate feeding during flushing, resulting in a significant increase in twin births (from none to five out of nine ewes). The introduction of Azolla feeding helped her save Rs. 40 per day on feed costs, reducing expenses by 25%. Post-intervention, her flock size expanded to 24 ewes, 2 rams, and 14 growers, leading to a 30% increase in income.

Mr. Poongavanam of Melkottai village, starting with 12 ewes and 2 rams, acquired a genetically superior ram at a 60% subsidy. With 150 g of concentrate feed per ewe, lamb birth weights improved, and mortality rates declined. Technical training on feeding, summer management, and unconventional fodder helped reduce feed costs by 15% while boosting profits by 25%. Likewise, Mr. M. Rajini of Saklinatham village, who initially had 25 ewes, 1 ram, and 10 lambs, replaced his genetically poor ram with a superior one through the scheme. Training in breeding, nutrition, and management increased lamb birth weights from 2.0 kg to 2.8 kg and accelerated their growth, reducing the time to reach maturity. The use of Azolla reduced feed costs by 15%, while better breeding practices led to decreased inbreeding defects and higher reproductive

efficiency. His overall profit increased by 15%.

Fig 13,14: Success stories highlight the tangible impact of scientific interventions in sheep farming


These success stories highlight the tangible impact of scientific interventions in sheep farming, demonstrating improved birth weights, faster growth rates, reduced feed costs, and increased incomes. Farmers, impressed by these results, are now actively sharing their experiences, encouraging wider adoption of best practices across their communities.

ETHICAL APPROVAL

This study was a field-based observational study.

REFERENCES

Ahmed, S. K., Selvam, S., & Kumaresan, A. (2016). Effect of feeding Azolla-based diet on performance of sheep. Indian Journal of Animal Research, 50(4), 602–606. https://arccjournals.com/journal/indian-journal-of-animal-research/B-2938

Ajafar, M. H., Kadhim, A. H., & AL-Thuwaini, T. M. (2022). The reproductive traits of sheep and their influencing factors. Reviews in Agricultural Science, 10, 82-89. https://www.jstage.jst.go.jp/article/ras/10/0/10_82/_html/-char/en

Chinnathambi, V., Meenalochani, V., Balachandran, P., & Murugan, M. (2025). Addressing field constraints in sheep farming: Pathways to sustainability and economic growth. International Journal of Agriculture Extension and Social Development, 8(3), 295-302. https://www.extensionjournal.com/article/view/1713/8-3-62

Karunanithi, K., Rajendran, R., and Kandasamy, N. (2005). Breed characteristics of Mecheri sheep. Animal Genetic Resources Information (AGRI), 37, 53–62. DOI: 10.1017/S1014233900001966

Kumar, A., Sharma, M., & Kaushik, R. (2021). Effect of oilseed cakes on growth of lambs. Indian Journal of Animal Research, 55(11), 1325–1330. https://doi.org/10.18805/IJAR.B-4384

Kumar, S., Dey, A., & Jadon, N. S. (2017). Management practices to reduce lamb mortality in Rajasthan. Indian Journal of Small Ruminants, 23(1), 42–47. https://doi.org/10.5958/0976-0555.2017.00037.0

Meena, M. S., Bairwa, R. K., & Sharma, R. K. (2021). Participatory assessment of ethno-veterinary practices in small ruminant management. Indian Journal of Animal Sciences, 91(2), 144–149. https://epubs.icar.org.in/ejournal/index.php/IJAnS/article/view/109497

Ravimurugan, T., Elango, A., & Venkataramanan, R. (2022). Effects of inbreeding on reproductive and fitness traits in Nilagiri sheep. Livestock Science, 259, 104928. https://doi.org/10.1016/j.livsci.2022.104928

Roy, A., Mandal, A. B., & Sharma, K. (2015). Feeding Azolla to Hariana heifers: A performance study. Indian Journal of Dairy Science, 68(5), 453–456. https://ebook.icar.gov.in/index.php/IJDS/article/view/50583

Sankar, P., Senthilkumar, P., Sribalaji, N., Nalini, P., Arun, L., & Muralidharan, J. (2020). Effect of feeding

Azolla meal on growth performance of Mecheri sheep. International Journal of Current Microbiology and Applied Sciences, 9(5), 1945-1949. https://doi.org/10.20546/ijcmas.2020.905.222

Sasidhar, P. V. K., Chand, K., & Anitha, K. (2013). Training farmers on marketing strategies for livestock. Indian Journal of Small Ruminants, 33(1), 61–66. https://doi.org/10.5958/j.0976-0563.33.1.007

Tiwari, R., Dutta, N., & Chaturvedi, V. B. (2012). Nutritional management of ewes for better reproductive performance. Indian Journal of Small Ruminants, 32(1), 24–29. https://doi.org/10.5958/j.0976-0563.32.1.004

General comments

The authors are required to make revisions to the abstract, introduction, methodology, results, and discussion sections. The introduction should begin with a general overview of global sheep farming and then specifically address the situation in Tamil Nadu. The methodology section lacks a comprehensive description of the study area, including a map, as well as details on the research design, sampling methods, data collection, data analysis techniques, and statistical tools used for analysis. While the results and discussions are quite satisfactory, as are the conclusion and success stories, the manuscript needs a MINOR revision before it can be considered for potential publication.