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Knowledge level and adoption status of scientific cattle rearing practices among livestock farmers in NTR District of Andhra Pradesh

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Abstract

The livestock sector, particularly cattle rearing, is a cornerstone of rural livelihoods in India, yet it faces a persistent productivity gap due to the slow adoption of scientific management practices in livestock. The study was conducted in the NTR District of Andhra Pradesh during the 2024-2025 period to investigate the socio-economic profile, knowledge levels, and adoption status of 120 livestock farmers regarding scientific cattle rearing practices using an ex-post facto research design. The demographic analysis revealed a landscape dominated by middle-aged individuals (49.17%) with predominantly primary education (30.00%) and small-scale operations, as 62.50% of respondent's maintained herds of fewer than four animals. Communication patterns showed a significant reliance on digital tools, with mobile phone and internet utilization exceeding 90%, while traditional peer-to-peer networks through fellow farmers remained a primary personal source of information. Knowledge levels were found to be highest in routine areas such as gestation periods (95.00%) and milk pricing (100.00%), yet critical deficiencies were noted in specialized practices like neonatal naval cord care and Azolla cultivation, both of which registered 0% knowledge. This knowledge gap translated directly into adoption patterns, where 53.33% of farmers fell into the medium adoption category. While there was universal adherence to basic hygiene and seeking veterinary treatment, modern techniques such as fodder preservation and the management of repeat breeders saw negligible adoption. The primary constraints inhibiting progress were identified as the low productivity of local breeds (91.67%) and seasonal fodder scarcity (76.67%). Ultimately, the study underscores a moderate level of scientific adherence (Mean Adoption Score of 63.99) and highlights the urgent need for targeted extension interventions that leverage existing ICT infrastructure to bridge the gap between traditional management and modern, high-productivity dairy science.

Keywords: Scientific cattle rearing, knowledge level, adoption gap, NTR District, Livestock Extension, ICT in Agriculture

1. Introduction

The livestock sector is a foundational pillar of global and national agriculture, providing essential sustenance, raw

materials, and economic stability. Globally, it contributes significantly to food security through the supply of milk, meat, and eggs, and serves as a natural capital asset and a

safety net for millions of marginal and landless farmers. In developing countries, particularly in India, livestock acts as a vital source of supplementary income, employment, and organic manure. The dairy industry, centered on cattle rearing, holds immense potential for poverty alleviation and nutritional security, often functioning as a critical component of climate resilience in mixed farming systems. India is home to one of the largest livestock populations in the world, positioning cattle rearing as a socio-economic priority. The sector contributes substantially to the Gross Value Added (GVA) from agriculture and allied sectors. However, despite the large numbers, the average productivity per animal remains low compared to global standards. This productivity deficit is primarily attributed to traditional, non-scientific management practices regarding feeding, breeding, health, and housing. Bridging this gap requires the effective transfer and adoption of scientific cattle rearing practices developed by research institutions. The successful uptake of these practices, such as balanced feeding, timely vaccination, artificial insemination (AI), and hygienic milking, is key to enhancing the genetic potential of the animals and ensuring sustainable production growth. Scientific cattle rearing practices are systematically designed to minimize risks, maximize resource use efficiency, and optimize animal health and productivity. The non-adoption or partial adoption of these practices results in substantial economic losses due to lower milk yield, higher mortality rates, and increased susceptibility to diseases. Therefore, a critical challenge for agricultural extension systems is to understand the factors that facilitate or impede the adoption of these beneficial technologies. Research in this area is crucial for formulating targeted intervention strategies that can effectively overcome socio-economic, infrastructural, and perceptual barriers faced by farmers.

Need of the study

The present study focuses on the NTR District, a region characterized by its unique agro-climatic conditions and its contribution to the state's dairy economy. The district's livestock farmers operate within a specific set of resource constraints, market access issues, and prevailing traditional knowledge systems. To date, a systematic and localized investigation into the level of knowledge possessed by the farmers regarding scientific cattle rearing, and the corresponding extent of adoption of these practices, remains limited. Understanding the specific context of NTR District is essential, as adoption patterns are highly dependent on local factors such as feed availability, access to veterinary services, and prevailing extension mechanisms.

Study Area and Livestock Profile

The study was conducted in NTR District, Andhra Pradesh, a region reorganized from the former Krishna District. Characterized by a significant agricultural base and diverse agro-climatic conditions, the district provides an ideal ecosystem for both crop and livestock farming. While the district's poultry population is vast, the traditional livestock sector is primarily defined by Buffaloes (235,052) and Sheep (234,933). Cattle, the focal point of this research, represent a specialized segment of 28,397 head. Interestingly, the demographic distribution is highly regional; the Nandigama Division alone accounts for a

significant portion of the district's cattle (11,428), justifying it as a primary focal point for this study.

Species	Population
Commercial Poultry	3,243,339
Buffaloes	235,052
Sheep	234,933
Goats	91,979
Cattle (Study Focus)	28,397
Backyard Poultry	655,886

Methodology

By considering above factors the present study under taken with objectives of investigate the profile characteristics, knowledge level, and adoption status of livestock farmers about scientific cattle rearing practices, by using an *Ex-post facto* research design. The study involved a total sample of 120 respondents selected from the NTR District of Andhra Pradesh through a multi-stage random sampling procedure. This sampling process began with the purposeful selection of Six Mandals—Nandigama, Jaggayyapeta, Vastavai, Penuganchiprolu, Chandharlapadu, and Kanchikacherla—from which two villages were selected by using randomly chosen each Mandal, followed by the selection of ten livestock farmers from each village. Data were systematically collected using a structured interview schedule, which was administered in the local language, Telugu, by an interviewer proficient in the dialect to ensure accuracy and contextual comprehension. The collected information will be subjected to analysis using appropriate descriptive statistical measures, including Mean, Median, Percentage, and Arithmetic Mean, to effectively interpret and present the findings.

Arithmetic Mean

It is defined as the sum of the observations divided by its number. Arithmetic mean was used for categorization of respondents on all the profile characteristics of the study.

$$\bar{x} = \frac{\sum x}{n}$$

Where, $\bar{x}$ = Mean

$\sum x$ = sum of scores

n = Number of respondents

Standard Deviation

It is positive square root of the mean of the squared observation taken from arithmetic mean. It was used to find out the variation in the score in the dependent variable and for categorization of respondents.

$$\sigma = \sqrt{\frac{1}{n} \left(\sum x^2 - \frac{(\sum x)^2}{n} \right)}$$

where,

σ = Standard Deviation

$\sum x^2$ = Sum of squares of observations

$[\sum x]^2$ = Square of sum of 'x' values

n = Number of observations

Frequencies and Percentages

Frequency and percentages were used to know the distribution pattern of respondents according to objectives under study. Percentages were used for standardization of sample size by calculating the number of individuals that would be under a given category, if the total number of

cases were hundred. Frequency was represented by 'n' and percentage was represented by '%' in the results of the study.

Results and Discussion

Profile Characteristics of livestock farmers

Table 1: Distribution of livestock farmers according to their Profile Characteristics

S. No		Frequency	Percentage
A.	Age		
1.	Young age(<36 years)	42	35.00
2.	Middle age(36-46)	59	49.17
3.	Old age(>46)	19	15.83
B.	Education		
1.	Illiterate (0)	12	10.00
2.	Primary education (Up to 4 th)	36	30.00
3.	Middle (5 th to 8 th)	29	24.17
4.	Secondary education (8 th to 10 th)	31	25.83
5.	Higher Secondary (12 th Passed)	9	7.50
6.	Graduation and above	3	2.50
C.	Family size		
1.	Small	48	40.00
2.	Medium	52	43.33
3.	Large	20	16.50
D.	Herd Size		
1.	Small (<4 animals)	75	62.50
2.	Medium (5-6 animals)	32	26.67
3.	Large (6 animals)	13	10.83
E.	Milk Production		
1.	Low (<5 lit)	75	62.50
2.	Medium (5-9 lit)	32	26.67
3.	High (>9lit)	13	10.83
F.	Annual income		
1.	Low (<0.75)	8	6.67
2.	Medium (0.75-1.50 Lakh)	75	62.50
3.	High (>1.5Lakh)	37	30.83
G.	Land Holding		
1.	Landless	24	20.00
2.	Marginal	30	25.00
3.	Small (1-2 ha.)	20	16.67
4.	Semi medium (2.1-4 ha.)	26	21.67
5.	Medium (4.1-10ha)	7	5.83
6.	Large (>10 ha.)	13	10.83

A. Age

The profile is dominated by middle-aged adults, with nearly half of the respondents (49.17%) falling into the 36-46 years category. This suggests that the cattle-rearing activity is largely managed by experienced, prime-working-age individuals. A substantial younger segment (below 36 years) makes up 35.00%, indicating continuity in the profession, while the older age group (above 46 years) is the smallest at 15.83%. Similar type of findings identified by Sharma *et al.* (2020) ^[1] and Kachhawaha *et al.* (2021) ^[2].

B. Education

The overall educational attainment of the respondents is low to medium. The single largest group (30.00%) has only primary education (up to 4th grade). When combined with those who have middle school education (24.17%), over half (54.17%) have a middle-school level of formal schooling or less. Furthermore, 10.00% of the respondents are illiterate. Conversely, only a small fraction (10.00%) have completed higher secondary or attained a graduation

degree, suggesting potential challenges in absorbing complex, technical information or modern extension recommendations. Similar type of findings were identified by Dhayal *et al.* (2015) ^[3].

C. Family Size

The respondents predominantly belong to medium or small family sizes. The medium family size is the most common (43.33%), closely followed by small families (40.00%). Together, these two categories account for 83.33% of the total respondents. Only a minority (16.50%) belong to large families, indicating a trend towards nuclear or smaller joint households.

D. Herd Size

The enterprise is characterized by small-scale operations. A significant majority of the respondents (62.50%) maintain a small herd of fewer than 4 animals. This overwhelming prevalence of small herds, with only 10.83% managing a large herd (more than 6 animals), strongly suggests that

cattle rearing functions primarily as a supplementary, subsistence-level activity rather than a large commercial business for the majority of the population studied. In line findings were identified by DAHD (2019) ^[4] in the 20th Livestock Census and Rao *et al.* (2022) ^[5].

E. Milk Production

Regarding milk production, the majority of farmers fall into the low-production category, with 62.50% producing less than 5 liters. Only a small fraction (10.83%) achieves high production levels of more than 9 liters, suggesting that most cattle rearing in the study area is small-scale or subsistence-based. Similar types of findings were identified by Singh *et al.* (2021) ^[6], Meena *et al.* (2025) ^[7] and Gopi *et al.* (2020) ^[8].

F. Annual Income

In terms of annual income, the data shows that 62.50% of the farmers earn a medium income ranging from 0.75 to 1.50 Lakh. While nearly 31% belong to the high-income

group (above 1.5 Lakh), only a very small minority (6.67%) survives on a low income of less than 0.75 Lakh, indicating a relatively stable economic standing for most participants. Similar type of findings were identified by Kumar *et al.* (2021) ^[9], Chavan *et al.* (2023) ^[10].

G. Land Holding

The land holding patterns are diverse, with marginal farmers (25.00%) and semi-medium farmers (21.67%) making up the largest segments. Notably, 20.00% of the cattle farmers are landless, highlighting that land ownership is not a strict requirement for cattle rearing. Conversely, medium and large-scale landholders represent the smallest portions of the community, totaling roughly 16.66% combined. Similar type of findings were identified by Birthal *et al.* (2012) ^[11], Patil *et al.* (2024) ^[12].

H. Information sources availability and utilization of livestock farmers

Table 2: Distribution of cattle farmers according to their availability and utilization of Communication channels

Communication channel	Availability and utilization							
	Available		Not available		Utilized		Not utilized	
	F	%	F	%	F	%	F	%
Personal localite								
1.Family members	78	65.00	42	35.00	56	46.67	64	53.33
2.Relatives/friends	56	46.67	64	53.33	75	62.50	45	37.50
3.Progressive farmers	81	67.50	39	32.50	78	65.00	42	35.00
4.Fellow farmers	107	89.17	13	10.83	84	70.00	36	30.00
Personal Cosmopolite								
1.Extension worker/veterinarian	87	72.50	33	27.50	82	68.33	38	31.67
2.Para veterinarian	45	37.50	75	62.50	49	40.83	71	59.17
3.Scientists	30	25.00	90	75.00	32	26.67	88	73.33
4.NGOs	15	12.50	105	87.50	19	15.83	101	84.17
Impersonal Cosmopolite								
1.Newspaper	96	80.00	24	20.00	94	78.33	26	21.67
2.Radio	15	12.50	105	87.50	15	12.50	105	87.50
3.Television	89	74.17	31	25.83	89	74.17	31	25.83
4.Farm magazine	11	9.17	109	90.83	11	9.17	109	90.83
5.Internet	109	90.83	11	9.17	109	90.83	11	9.17
6.Mobile	110	91.67	10	8.33	110	91.67	10	8.33

The data presented in the table 2 reflects the availability and utilization of various communication channels by the 120 respondents for obtaining scientific livestock information. The sources are categorized into Personal Localite, Personal Cosmopolite, and Impersonal Cosmopolite channels.

1. Personal Localite Channels

Among the personal localite sources, fellow farmers were found to be the most available (89.17%) and most utilized (70.00%) source of information. This was followed by progressive farmers, who were available to 67.50 percent of respondents and utilized by 65.00 percent. Family members were available to 65.00 percent but utilized by only 46.67 percent, indicating that while family is present, they may not always be viewed as the primary source of technical expertise.

2. Personal Cosmopolite Channels

In this category, extension workers/veterinarians emerged as

the most significant source, with 72.50 percent availability and 68.33 percent utilization. This highlights the critical role of formal technical support in the region. Conversely, scientists (25.00%) and NGOs (12.50%) showed very low availability and utilization, suggesting a lack of direct contact between research institutions and the farming community.

3. Impersonal Cosmopolite Channels

Digital and modern media dominated this category. Mobile phones and the Internet were available to and utilized by nearly all respondents (91.67% and 90.83% respectively), marking a shift toward ICT-based extension. Newspapers (80.00%) and Television (74.17%) also remained strong traditional sources. However, conventional print and audio media like farm magazines (9.17%) and radio (12.50%) showed the lowest levels of availability and utilization among all channel

II. Knowledge about Scientific cattle rearing Practices in the livestock (n=120)

Table 3: Distribution of livestock farmers according to their Knowledge on level of knowledge cattle rearing practices

S. No.	Cattle rearing practices	Yes		No	
		F	%	F	%
A.	Breeding practices				
1	Artificial insemination technique	83	69.17	37	30.83
2	Period of estrus cycle in cattle	92	76.67	28	23.33
3	Right time of insemination of animal in health	74	61.67	46	38.33
4	Correct age of insemination for heifer	91	75.83	29	24.17
5	Optimum calving interval of buffalo	78	65.00	42	35.00
6	Optimum dry period of buffalo	91	75.83	29	24.17
7	Gestation period of cattle	114	95.00	6	5.00
8	Lactation length of cow	110	91.67	10	8.33
B.	Feeding practices				
1	Cultivation of green fodder using high yielding seeds	76	63.33	44	36.67
2	Importance of feeding concentrate feed	66	55.00	54	45.00
3	Importance of mineral mixture	51	42.50	69	57.50
4	Importance of green fodder	89	74.17	31	25.83
5	Importance of feeding chaffed fodder	91	75.83	29	24.17
6	Importance of colostrum feeding	78	65.00	42	35.00
7	Right time to provide colostrum	75	62.50	45	37.50
8	Fodder preservation techniques (hay/silage)	67	55.83	53	44.17
C.	Health care practices				
1	Deworming schedule	48	40.00	72	60.00
2	Vaccination schedule	41	34.17	79	65.83
3	Diseases spread from animal to human	78	65.00	42	35.00
4	Ecto parasite control measures	66	55.00	54	45.00
5	Common diseases of cattle and their management	89	74.17	31	25.83
D.	Management practices				
1	Bathing the dairy animals twice during summer	56	46.67	64	53.33
2	Isolation of sick animals	87	72.50	33	27.50
3	Quarantine of animals	82	68.33	38	31.67
4	Disinfection of animal shed	62	51.67	58	48.33
5	Dipping of teats after milking	38	31.67	82	68.33
6	Castration and its importance	110	91.67	10	8.33
7	Correct method of milking	102	85.00	18	15.00
8	Importance of cattle insurance	92	76.67	28	23.33
9	Price of milk on the basis of fat	120	100.00	0	0.00

Practice-Wise Knowledge Level of Dairy Farmers

Efforts were made to find out the practice-wise knowledge level of the respondents. The results were analyzed and discussed below:

1. Knowledge about Breeding Practices

The data concluded that a high percentage of respondents possessed knowledge about key breeding practices. Pregnancy diagnosis after 3 months by veterinarian (76.67%), Treatment of anoestrus animals (74.17%), More than half of the respondents had knowledge about, Drying of animals for 60-90 days before calving (67.50%), Artificial insemination (60.00%), Inseminating the cow within 60-90 days after calving (59.17%). However, less than half (43.33 per cent) of respondents knew about Insemination at mid heat. Crucially, 0.00 per cent of respondents had knowledge about the Treatment of repeat breeders by veterinarian. Respondents are generally aware of the need for veterinary involvement in general diagnosis and the timing of post-calving and pre-calving management. However, the minimal knowledge of mid-heat insemination and the complete ignorance of veterinary treatment for repeat breeders indicate that producers are likely experiencing poor conception rates and failing to utilize specialized veterinary services to address persistent fertility

problems, which is critical for herd profitability.

2. Knowledge about Feeding Practices

Regarding Feeding practices, knowledge was notably high for essential nutritional management. Feeding of extra ration to pregnant animals (91.67%), Chaffing of green fodder (88.33%), Other practices with good knowledge included, Feeding of extra concentrates to milch animals (76.67%), Feeding of mineral mixture (61.67%), Feeding of concentrates (51.67%). In stark contrast, only 12.50 per cent of respondents knew about Fodder preservation through hay/silage. The practice of Cultivation of azolla had 0.00 per cent knowledge. While respondents are well-versed in the daily regimen of providing rations and supplements to productive and pregnant animals, they are critically deficient in knowledge concerning advanced, sustainable feed management techniques like preservation (hay/silage) and utilizing alternative feeds (Azolla). This suggests a reliance on conventional feeding methods without planning for year-round feed quality and availability.

3. Knowledge about Health Care Practices

In the case of Health care practices, knowledge of veterinary intervention and colostrum feeding was exceptionally high. Treatment by qualified veterinarian (100.00%), Feeding of

colostrum to new born within 3 hrs of birth (95.83%). Other health measures showed strong knowledge, Timely Vaccination (74.17%), Isolation of sick animals from healthy animals (60.00%), Knowledge was exactly half or below for Regular deworming (51.67%). Most critically, 0.00 per cent of respondents had knowledge of Cutting of naval cord and applying tincture to newly born calves. While there is excellent knowledge regarding seeking veterinary intervention and ensuring colostrum feeding (the two most critical practices for immediate survival), respondents show a substantial deficiency in basic neonatal hygiene (naval cord care) and consistent parasite control (deworming). This suggests a focus on reactive treatment rather than comprehensive preventative care.

4. Knowledge about Management Practices

The data for Management practices revealed that 100.00 per cent of respondents had knowledge about four practices: Cleaning of animal sheds regularly, Washing of hand and udder before milking, Full hand milking, Treatment by qualified veterinarian, Other practices with very high knowledge included: Correct method of milking (94.17%), Washing of udder after milking (72.50%), Separate housing for animals (71.67%), Washing of animal before milking (71.67%), Knowledge was lower for non-routine or ancillary management, Taking active participation in animal treatment camp, trainings etc. (46.67%), Maintenance of records (35.00%). Respondents possess strong foundational knowledge concerning daily hygiene and immediate animal

health care, as evidenced by the near-universal awareness of proper cleaning, milking, and veterinary contact procedures. However, there is a clear opportunity to improve knowledge and participation in long-term strategic and administrative practices, such as engagement in training programs and systematic record keeping.

Table 4: Distribution of respondents according to their overall Knowledge about scientific rearing practices of livestock management practices

S. No	Knowledge	Frequency	Percentage
1.	Low (0-55.00)	22	18.33
2.	Medium (55.00-78.00)	79	65.84
3.	High (>78.00)	19	15.83
		120	100.00
Mean=66.58 SD=11.58			

From the table it could be concluded that majority of the respondents (65.84%) possessed a medium level of knowledge, followed by 18.33 percent with a low level, while the remaining 15.83 percent fell into the high knowledge category regarding scientific livestock rearing practices. Similar types of findings identified by Sharma *et al.*, (2020) ^[1], Makarabbi *et al.* (2025) ^[13], Mondal *et al.* (2025) ^[14], Patel *et al.* (2022) ^[15], Rajkumar *et al.* (2025) ^[16], Sabapara *et al.* (2016) ^[17], sharma *et al.* (2020) ^[1].

III. Adoption of Scientific Cattle rearing practices in the livestock (N=120)

Table 5: Practice wise Adoption of different scientific cattle rearing practices

S. No.	Dairy farming practices	Adoption		Partial		Non Adoption	
		F	%	F	%	F	%
A.	Breeding practices						
1.	Artificial insemination	72	60	21	17.5	27	40
2.	Insemination at mid heat	48	43.33	32		40	56.67
3.	Pregnancy diagnosis after 3 months by veterinarian	92	76.67	11		17	23.33
4.	Treatment of anoestrus animals	89	74.17	17		31	25.83
5.	Drying of animals for 60-90 days before calving	72	67.5	15		33	32.5
6.	Inseminating the cow within 60-90 days after calving	71	59.17	27		22	40.83
7.	Treatment of repeat breeders by veterinarian	23	0	64		120	100
B.	Feeding practices		0			120	100
1.	Feeding of concentrates	60	51.67	31		29	48.33
2.	Feeding of mineral mixture	61	61.67	27		32	38.33
3.	Chaffing of green fodder	69	88.33	23		28	11.67
4.	Cultivation of azolla	15	0	25			100
5.	Feeding of extra raion to pregnant animals	83	91.67	27		10	8.33
6.	Feeding of extra concentrates to milch animals	71	76.67	15		34	23.33
7.	Fodder preservation through hay/silage	46	12.5	32		42	87.5
C.	Health care practices						
1.	Cutting of naval cord and applying tincytur to newly born calves		0			120	100
2.	Regular deworming	62	51.67	32		26	48.33
3.	Timely Vaccination	69	74.17	20		31	25.83
4.	Feeding of colostrum to new born within 3 hrs of birth	104	95.83	9		7	4.17
5.	Isolation of sick animals from healthy animals	72	60	27		48	40
6.	Treatment by qualified veterinarian	120	100			0	0
D.	Management practices		0			120	100
1.	Taking active participation in animal treatment camp, trainings etc	56	46.67	47		17	53.33
2.	Cleaning of animal sheds regularly	120	100			0	0
3.	Separate housing for animals	62	71.67	32		26	28.33
4.	Maintenance of records	26	35	42		52	65
5.	Correct method of milking	91	94.17	20		9	5.83
6.	Washing of animal before milking	86	71.67	22		12	28.33
7.	Washing of hand and udder before milking	120	100	0	0	0	0
8.	Washing of udder after milking	49	72.5	49		22	27.5
9.	Full hand milking	120	100	0	0	0	0

Analysis of Adoption of Dairy Farming Management Practices

The findings from the Table No: 5 regarding the adoption of improved dairy management practices revealed a diverse landscape of adherence across breeding, feeding, health, and general management.

A. Breeding Practices: It was observed that a significant majority of respondents (76.67%) adopted pregnancy diagnosis by a veterinarian after three months, and 74.17% followed the practice of treating anoestrus animals. While AI (Artificial Insemination) was adopted by 60.00% of farmers, a critical gap remains in the treatment of repeat breeders, where 100% of the respondents fell into the non-adoption category, indicating a total reliance on traditional methods or a lack of access to specialized veterinary intervention for chronic breeding issues.

B. Feeding Practices: The data showed that high-value practices like feeding extra rations to pregnant animals (91.67%) and chaffing green fodder (88.33%) were widely adopted. However, modern practices such as the cultivation of Azolla for supplemental protein saw 0% adoption. Similarly, a staggering 87.5% of respondents did not practice fodder preservation through hay or silage, suggesting that farmers in the study area rely primarily on fresh fodder and lack a "buffer" strategy for seasonal fodder scarcity.

C. Health Care Practices: A highlight of the study was the 100% adoption rate for seeking treatment from qualified veterinarians, showing a strong trust in professional medical help. Furthermore, 95.83% of respondents followed the vital practice of feeding colostrum to newborns within 3 hours. Conversely, a major gap was identified in neonatal care: 100% of respondents failed to adopt the practice of cutting the naval cord and applying tincture to newly born calves, posing a significant risk for naval-related infections.

D. Management Practices: General cleanliness practices saw the highest levels of success. 100% of respondents regularly cleaned animal sheds, washed hands and udders before milking, and utilized the full-hand milking method. The data reflected high adoption for correct milking methods (94.17%) and washing animals before milking (71.67%). However, record-keeping remains a weakness, with 65.00% of respondents not maintaining any formal records of their dairy operations.

Distribution of respondents of respondents according to their adoption level

Table 6: Overall adoption of livestock farmers about different scientific rearing practices

S. No	Adoption level	Frequency	Percentage
1.	Low (0-33.33)	33	39.61
2.	Medium (33.33-66.66)	64	53.33
3.	High (>66.66)	23	19.16
		120	100.00
Mean=63.99 S.D=27.44			

The findings reveal that the majority of the respondents (53.33%) fell into the Medium Adoption category. This was followed by 27.50% (33 respondents) in the Low Adoption group, while only 19.16% of the farmers were categorized under High Adoption. These results are in conformity with the findings of Boarte and Gimhavanekar (2020) ^[3], Kachhawaha *et al.* (2021) ^[7], Makarabbi *et al.* (2025) ^[12], Mondal *et al.* (2025) ^[16], Sabapara *et al.* (2016) ^[26], and Singh *et al.* (2021) ^[28], all of whom observed that dairy farmers typically operate at a medium level of adoption due to varying socio-economic and resource constraints.

IV. Constraints faced by the livestock farmers in the adoption of scientific rearing practices

S. No.	Constraints	Frequency	Percentage
A.	Breeding		
1.	Lack of knowledge about improved breeding practices	101	84.17
2.	Low productivity of local breeds	110	91.67
3.	Distant location of AI centres	52	43.33
4.	Low conception rate of AI	41	34.17
5.	Repeat breeding problem	72	60.00
B.	Feeding		
1.	Non availability of green fodder throughout the year	92	76.67
2.	Lack of knowledge and unavailability of seeds of HYV of fodder crops	86	71.67
3.	Lack of knowledge of mineral mixture feeding	73	60.83
4.	Unavailability of grazing pasture land	69	57.50
5.	Lack of knowledge about balanced feeding	56	46.67
C.	Health care		
1.	Lack of knowledge about vaccination, deworming and disease control measures	74	61.67
2.	Unavailability of separate place for isolation of sick animal	49	40.83
3.	Lack of proper veterinary services in time	58	48.33
4.	High cost of concentrates	106	88.33
D.	Management		
1.	Inadequate knowledge of scientific housing	82	68.33
2.	High cost of scientific housing	78	65.00
3.	Lack of knowledge about clean milk practices and its importance	82	68.33
4.	Poor knowledge and difficulty in maintaining records due to illiteracy	63	52.50
5.	Poor knowledge regarding calf rearing practices	52	43.33

E.	Other problems		
1.	Lack of credit facility	89	74.17
2.	High cost of milch animals	109	90.83
3.	Non-availability of reliable source for cattle purchasing	89	74.17
4.	Poor economic condition	79	65.83
5.	Middle men not providing remunerative price	71	59.17

A. Breeding Constraints

The primary limitation in breeding practices is the low productivity of local breeds (91.67%), which affects the vast majority of farmers. Compounding this genetic limitation is a significant lack of knowledge about improved breeding practices (84.17%). Furthermore, production is hindered by the repeat breeding problem (60.00%), while the adoption of modern techniques like Artificial Insemination (AI) is hampered by the distant location of AI centres (43.33%) and a low conception rate of AI (34.17%), suggesting issues with both access and technical success of the procedure. These findings in line with the findings of Yadav *et al.* (2016) ^[32], Meena *et al.* (2022) ^[13], Patel *et al.* (2022) ^[18], Sreeram *et al.* (2024) ^[29].

B. Feeding Constraints

The most frequently reported challenge in livestock is related to feeding is the non-availability of green fodder throughout the year (76.67%), indicating a substantial seasonal nutritional gap. Farmers also suffer from a lack of knowledge and unavailability of seeds of High Yielding Varieties (HYV) of fodder crops (71.67%), which is key to year-round fodder production. Knowledge deficits further extend to not knowing about mineral mixture feeding (60.83%) and balanced feeding (46.67%). The physical constraint of unavailability of grazing pasture land (57.50%) necessitates higher reliance on costly purchased feeds. These findings were in line with the findings of Kishore *et al.* (2021) ^[9], Meena *et al.* (2022) ^[13], Rajkumar and Kavitha (2025) ^[21], Sharma *et al.* (2020) ^[27].

C. Health Care Constraints

While grouped under health care, the most severe constraint in this section is the high cost of concentrates (88.33%), which significantly impacts the ability to maintain animal health through proper nutrition. In terms of direct health management, a major concern is the lack of knowledge about vaccination, deworming, and disease control measures (61.67%). Access to professional help is also an issue, with a considerable percentage of farmers reporting a lack of

proper veterinary services in time (48.33%). Finally, basic biosafety is compromised by the unavailability of a separate place for the isolation of sick animals (40.83%). These type of findings in line with the findings of Gopi *et al.* (2025) ^[6], Kishore *et al.* (2021) ^[9], Meena *et al.* (2022) ^[13], Patel *et al.* (2022) ^[18], Sreeram *et al.* (2024) ^[29].

D. Management Constraints

Management challenges center heavily on knowledge gaps, with farmers reporting nearly equal difficulty with inadequate knowledge of scientific housing (68.33%) and lack of knowledge about clean milk practices and its importance (68.33%). The adoption of scientific housing is also restricted by the high cost associated with it (65.00%). Furthermore, the ability to make informed decisions is hindered by poor knowledge and difficulty in maintaining records due to illiteracy (52.50%), and a substantial portion of farmers also exhibit poor knowledge regarding calf rearing practices (43.33%). Similar type of findings were in line with findings of Rajkumar and Kavitha (2025) ^[21], Sabapara *et al.* (2016) ^[26], Yadav *et al.* (2016) ^[32] and Sharma *et al.* (2020) ^[27].

E. Other Problems

The overarching economic hurdle is the high cost of milch animals (90.83%), which serves as a major barrier to entry or expansion for farmers. This high capital requirement, combined with a lack of credit facility (74.17%) and the farmers' overall poor economic condition (65.83%), severely limits investment. Furthermore, issues in the value chain, such as the non-availability of a reliable source for cattle purchasing (74.17%) and the problem of middlemen not providing remunerative prices (59.17%), further constrain the economic viability of the operation. Similar type of findings were identified by Meena *et al.* (2022) ^[13], Kishore *et al.* (2021) ^[9], Patel *et al.* (2022) ^[18] and Mondal *et al.* (2025) ^[16].

IV. Suggestions to overcome the constraints faced by the livestock farmers

S. No.	Suggestion	Frequency	Percentage
1.	Provide emergency treatment services	87	72.50
2.	Provide Artificial Insemination (AI) service and accurate Pregnancy Diagnosis (PD) service.	72	60.00
3.	Provision of Advanced Diagnostic Facilities	64	53.33
4.	Provision of adequate medicines and infrastructure facilities	110	91.67
5.	Increase number of Veterinarians	98	81.67
6.	supply of updated extension literature and technical information	112	93.33
7.	increase the milk price at collection center	92	76.67

Based on the data provided, the dairy farmers' suggestions to overcome constraints in accessing veterinary services reveal a clear prioritization of foundational support and resource availability. The highest priority, expressed by 93.33% of respondents, is the need for the supply of updated

extension literature and technical information, highlighting a critical knowledge gap and thirst for formal guidance. Closely following this is the demand for provision of adequate medicines and infrastructure facilities (91.67%), underscoring the severe operational constraint caused by a

lack of basic supplies in existing veterinary centers. Furthermore, 81.67% of farmers urgently request an increase in the number of Veterinarians, recognizing that the limited availability of expert staff directly restricts service access. High percentages also validated the need for practical, door-step services, including emergency treatment (72.50%) and the provision of AI and Pregnancy Diagnosis services (60.00%). Intriguingly, 76.67% of suggestions focused on the non-veterinary issue of an increase in the milk price at the collection center, which reflects the fundamental economic constraint that prevents farmers from affording existing services. Collectively, these findings show that farmers view the constraints as stemming less from technical complexity and more from systemic failures in infrastructure, staffing, and financial viability. The findings were in line with the findings of Gopi *et al.* (2025)^[6], Kishore *et al.* (2021)^[9], Meena *et al.* (2018)^[14], Sreeram *et al.* (2024)^[29], Vinya Kumar *et al.* (2017)^[31].

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