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Adoption of Recommended Cattle Management Practices among Farmers of Western Uttar Pradesh

Rajbir Singh[1], Shubham Singh[1], Raj Kumar[1], Deepak Kumar Verma[1], Kuldeep Kumar[1], Manoj Kumar[2], Akhilesh Kumar Singh[3]

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ABSTRACT

Background: In India, dairy is a very important for rural livelihood and round the year income, Uttar Pradesh have mixed crop-livestock farming system. Despite the availability of scientifically recommended cattle management practices, adoption among farmers remains low. The objective of the present study was to assess the adoption level of recommended cattle management practices.

Methods: The study was conducted in Bulandshahar and Meerut districts of Uttar Pradesh. A multistage sampling procedure was used to select districts in first step, in second block (two block from each district) in third village (four villages from each block) and in last step select respondents (20 respondents from each village). Data were collected through pre-tested and structured interview schedule. Adoption was measured using a three-point continuum (always = 2, sometimes = 1, never = 0). Descriptive statistics and chi-square tests were applied to examine relationships between socio-economic variables and adoption behaviour.

Result: Housing and feeding management practices gets higher adoption but breeding and health care practices gets poor adoption. Education, herd size and landholding had significant associations with adoption levels, while age showed limited influence.

Key words: Adoption, Dairy, Extension, Livelihood, Management, Sustainable.

INTRODUCTION

In India, diverse climatic conditions pose risks to farmers' livelihoods (Shukla *et al.,* 2023; Singh *et al.,* 2023), making livestock an essential support system, especially for small and landless farmers. It provides income, employment and food security (Kumari *et al.,* 2020; Karunanayaka *et al.,* 2022). Milk is an important source of income and nutrition to rural households (Dudi *et al.,* 2022; Kumar *et al.,* 2023). However, despite the availability of recommended cattle management practices, their adoption remains uneven among smallholder farmers (Quddus, 2012; Rathod *et al.,* 2016), leading to persistent productivity gaps (Duong *et al.,* 2023).

Earlier approaches emphasized awareness and information dissemination (Barakabitze *et al.,* 2017), but adoption is now recognized as a complex process shaped by economic viability, risk perception and institutional access (Feder *et al.,* 1985; Marra *et al.,* 2003; Barham *et al.,* 2015; Leeuwis and Aarts, 2020). Farmers evaluate technologies based on costs, labour and expected returns (Jack, 2013; Alexander *et al.,* 2020). With increasing links between livestock and food security, improving adoption strategies is crucial (Duru and Therond, 2015; Abu Hatab *et al.,* 2020). Sustainable dairy development requires integrating behavioural insights, financial inclusion and institutional support (Kilelu *et al.,* 2017; Gheorghe-Irimia *et al*., 2023; Neethirajan, 2024).

Practices offering immediate economic benefits, such as feeding, are more readily adopted, whereas preventive healthcare and infrastructure investments remain limited (Quddus, 2012; Kebebe, 2019; Hennessy *et al.,* 2019). This selective adoption creates vulnerabilities like disease risks and inefficiencies (Chaudhary *et al.,* 2013; Yadav *et al.*, 2014; Dhaka *et al.,* 2017). Resource-poor farmers operate under uncertainty and prioritize short-term survival (Millar and Connell, 2010; Singh *et al.,* 2024), while capital-intensive practices require reliable information and institutional support (Yadav *et al.,* 2014; Padhy *et al.,* 2024; Papakonstantinou *et al.,* 2024). This study examines adoption across breeding, feeding, housing and healthcare practices. It contributes to understanding constrained decision-making among farmers and provides insights for extension agencies and policymakers to address adoption gaps.

[1]School of Agricultural Sciences, IIMT University, Meerut-250 001, Uttar Pradesh, India.
[2]Animal Husbandry and Dairying, Krishi Vigyan Kendra, Moradabad-244 001, Uttar Pradesh, India.
[3]Department of Animal Husbandry and Dairying Faculty of Agriculture Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj-211 002, Uttar Pradesh, India.

Corresponding Author: Shubham Singh, School of Agricultural Sciences, IIMT University, Meerut-250 001, Uttar Pradesh, India. Email: shubhamsinghsvpuat@gmail.com

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MATERIALS AND METHODS

The study was conducted during 2024-25 under the institutional support of IIMT University, Meerut, Uttar Pradesh.

A multistage sampling procedure was adopted. Bulandshahar and Meerut districts were selected purposively, followed by four blocks (Meerut, Daurala, Lakhaoti and Khurja) based on higher milk production. From each block, four villages were selected and a list of cattle-rearing farmers was prepared. Farmers with a minimum of four cattle were selected to ensure inclusion of commercially oriented and actively engaged dairy farmers, providing more reliable and experience-based data. This criterion helps improve the validity of findings related to management practices and adoption behavior, making a total sample of 320 respondents.

Development of measurement instrument

A structured and pre-tested interview schedule was developed based on recommended cattle management practices covering four domains: breeding, feeding, housing and health care. Data were collected through personal interviews. Adoption of practices was measured using a three-point continuum (always = 2, sometimes = 1, never = 0). Use of a three-point adoption scale ensures simplicity, clarity and ease of response for farmers. The interview schedule was validated by experts in Agricultural Extension and pre-tested in a non-sample area. Reliability was assessed through Split half method to ensure internal consistency of the tool.

$$\text{Total adoption score} = (\text{Always} \times 2) + (\text{Sometimes} \times 1) + (\text{Never} \times 0)$$

Statistical tools and techniques

Both descriptive and inferential statistical techniques were used. In descriptive, frequency and percentage, mean adoption scores and ranking of practices were calculated. In inferential, the chi-square test was used to test the association between selected independent variable and adoption levels.

$$\text{MPS} = \left(\frac{\text{Obtained score}}{\text{Maximum possible score}}\right) \times 100$$

$$\chi^2 = \Sigma \frac{(Oi - Ei)^2}{Ei}$$

Where,

χ^2= Chi-square value.

O= Observed frequency.

E= Expected frequency.

Σ= Summation over all categories.

RESULTS AND DISCUSSION

Profile of respondents

Data presented in Table 1 indicated that majority of the dairy farmers (44.69%) belonged to the old age category, followed by middle age farmers (36.56%), while only 18.75 per cent were young. These findings suggested that the dairy farmers were experienced and cattle managed by them, due to their practical and traditional knowledge developed over time. With regard to education, 35.31 per cent of respondents had secondary education, similar findings reported by followed by Khode *et al., 2009,* 30.31 per cent were educated above secondary level. However, 13.44 per cent were illiterate. The relatively higher proportion of educated farmers indicates a favorable condition for adoption of scientific dairy practices. In terms of herd size, 43.44 per cent of respondents were maintained a medium herd size, while 38.75 per cent had large herd size. Only 17.81 per cent had small herds. This shows the commercialization of the dairy farming in the area, it also indicates that farmers increasingly maintaining moderate to large herd sizes to enhance income. Same pattern of herd size also reported by Godara *et al.* (2017). Landholding data shows that 42.81 per cent of respondents were small farmers, followed by marginal farmers (30.63%). Only 26.56 per cent farmers hold large land holdings. The pattern suggests that dairy farming acts as an important occupation for livelihood source and consistent income for small and marginal farmers. Family size revealed that nearly half of the respondents (48.75%) belonged to medium size families, followed by small families (28.44%). Larger families (22.81%) were comparatively fewer. Medium family size may provide adequate family labor for dairy operations without causing excessive economic burden.

Adoption of breeding practices

Table 2 reveals that the highest adopted practice was proper care during calving and post-calving heat (Mean score = 1.76; Rank I), followed by regular monitoring of heat symptoms (1.72; Rank II). These findings indicate that farmers are very conscious about practices that directly linked to animal productivity and survival. Similar with Rathore and Rathore (2014), reported that buffalo rearers prioritized practices which give immediate reproductive

Table 1: Profile of respondents (N = 320).

Variables	Category	N	%
Age	Young	60	18.75
	Middle	117	36.56
	Old	143	44.69
Education	Illiterate	43	13.44
	Primary	67	20.94
	Secondary	113	35.31
	Above secondary	97	30.31
Herd size	Small	57	17.81
	Medium	139	43.44
	Large	124	38.75
Land holding	Marginal	98	30.63
	Small	137	42.81
	Large	85	26.56
Family size	Small	91	28.44
	Medium	156	48.75
	Large	73	22.81

outcomes. The use of breeding bulls within the recommended age (1.37; Rank III) and timely insemination (1.24; Rank IV) were moderately adopted. Treatment of anoestrus and repeat breeding had satisfactory adoption (1.22; Rank V), suggesting awareness about the reproductive management. Panchbhai *et al*. (2017) reported moderate adoption of reproductive management practices and farmers respond actively when fertility problems affect milk production. However, very low adoption was observed in artificial insemination (0.43; Rank X) and pregnancy diagnosis (0.46; Rank IX). Due to lack of veterinary services, technical knowledge, or accessibility issues. Similar gap observed by Sarwar (2021). Providing exercise to pregnant cattle (0.62; Rank VIII) was also poorly adopted, possibly because farmers underestimate its importance. Contradictory findings were reported by Meena *et al*. (2012), higher adoption of institutional breeding support was observed in areas with strong extension contact. The overall mean score and adoption index was 1.10 and 54.49 per cent respectively which suggest moderate adoption of breeding practices. The results suggest that farmers prefer traditional and observable practices over technically specialized services. Rathore and Rathore (2014) also reported the same that mean score 1.05 and adoption was 52.18 per cent among the buffalo rearers.

Adoption of feeding practices

Table 3 indicates that extra feeding to advanced pregnant animals recorded the highest adoption (1.74; Rank I), followed by grazing animals at suitable summer timings (1.65; Rank II). These practices are directly associated with visible animal health and milk yield, explaining their higher adoption. Chopping dry fodder (1.55; Rank III) and providing clean drinking water (1.47; Rank IV) also showed good adoption levels. Feeding balanced concentrate mixture ranked fifth (1.18), indicating moderate awareness about nutritional management. Very low adoption was recorded for preparation of hay and silage (0.21; Rank IX) and round the year green fodder supply (0.71; Rank VIII). Due to lack of proper planning, storage facilities and technical guidance. Similar behaviour of farmers has been documented globally like feeding and neglecting long-term fodder storage (FAO, 2011). Similarly, Meena *et al.* (2012) also indicated gap between scientific fodder management and reasonable awareness of basic feeding practices. Mahesh (2020) also reported some similar and some contrast findings due to location of study.

Adoption of housing practices

Table 4 shows that providing adequate floor space was get higher adoption in housing practices (1.86; Rank I),

Table 2: Practice wise distribution of adoption of recommended cattle management practices (N = 320).

Practices	Always	Sometimes	Never	Total adoption score	Mean score	Rank
Breeding practices						
Monitoring heat symptoms of cattle regularly	230	90	0	550	1.72	II
Using artificial insemination with improved breeds	35	68	217	138	0.43	X
Natural mating with superior breeding bulls	89	210	21	388	1.21	VI
Timely insemination after heat detection	83	232	5	398	1.24	IV
Proper care during calving and post-calving heat	242	78	0	562	1.76	I
Pregnancy diagnosis after 60-90 days after breeding	73	0	247	146	0.46	IX
Breeding heifers at the correct age	39	231	50	309	0.97	VII
Treatment of anoestrus and repeat breeding	69	251	0	389	1.22	V
Using breeding bulls within recommended (2.5-7 years) age	119	201	0	439	1.37	III
Providing exercise to pregnant cattle	24	149	147	197	0.62	VIII

Table 3: Practice wise distribution of adoption of recommended cattle management practices (N = 320).

Practices	Always	Sometimes	Never	Total adoption score	Mean score	Rank
Feeding practices						
Feeding balanced concentrate mixture	93	192	35	378	1.18	V
Supplying green fodder throughout the year	81	65	174	227	0.71	VIII
Extra feeding to advanced pregnant animals	237	83	0	557	1.74	I
Feeding mineral mixture	79	152	89	310	0.97	VII
Chopping dry fodder before feeding	217	63	40	497	1.55	III
Providing clean and fresh drinking water	149	171	0	469	1.47	IV
Feeding common salt regularly	72	202	46	346	1.08	VI
Preparation of hay and silage	0	67	253	67	0.21	IX
Grazing animals at suitable summer timings	207	113	0	527	1.65	II

indicated that farmers give priority to the animal comfort. Proper orientation of cattle shed (1.65; Rank II) and loose housing system (1.51; Rank III) were also adopted widely. Moderate adoption was found in ventilation (1.33; Rank IV) and drainage (1.18; Rank V). Seasonal modification of housing (0.64; Rank VIII) was poorly adopted, due to lack of technical guidance and financial support. To modify the house or structural improvement required heavy capital investment, which may discourage smallholders. Conflicting results were found regarding pucca floors, pucca roof provisions and similar aspects like levelled floors, ventilation and practices to shield animals from extreme weather, as noted by Singh (2017); Meena (2017) and Kapadiya *et al.* (2022).

Adoption of health care practices

Table 5 reveals that most of the farmer adopted, daily observation for illness (1.72; Rank I) and cleaning and sanitation of sheds (1.65; Rank II). These practices are simple, low-cost and based on routine observation. Moderate adoption was seen in isolating sick animals (1.30), treatment of reproductive disorders (1.21) and parasite control (1.15). However, critical preventive measures such as regular deworming (0.40; Rank IX), timely vaccination (0.50; Rank VIII) and safe carcass disposal (0.28; Rank X) showed very low adoption. This indicates a reactive rather than preventive approach to animal health, where farmers focus more on visible illness than long-term disease prevention. Similar result in term of Proper veterinary treatment of sick animals and contradictory result for timely vaccination of animals, Isolating sick animals, Regular deworming of animals and cleaning and sanitation of shed were reported by the Kapadiya *et al.* (2022).

Relationship between selected variables and adoption of practices

The association between independent variables with adoption of recommended cattle management practices is presented in Table 6. Education had significant association with breeding (χ^2 = 15.49*), feeding (χ^2 = 16.21**) and health care practices (χ^2 = 19.47**), revealed that educated farmers were able to understand scientific management practices and also found reliable information from different sources. Education improves awareness, decision-making ability and openness to innovation. Similar findings were reported by Panchbhai *et al*. (2017), who observed that education influences adoption of improved dairy practices among farmers. Herd size also highly significant association with feeding (χ^2 = 22.14**)

Table 4: Practice wise distribution of adoption of recommended cattle management practices (N = 320).

Practices	Always	Sometimes	Never	Total adoption score	Mean score	Rank
Housing practices						
Proper orientation of cattle shed	186	156	22	528	1.65	II
Following loose housing system	164	156	0	484	1.51	III
Seasonal modification of housing	0	205	115	205	0.64	VIII
Providing adequate floor space	276	44	0	596	1.86	I
Proper size of pucca paved floor in the shed	49	153	118	251	0.78	VII
Providing bedding material in winter	59	235	26	353	1.10	VI
Adequate height and ventilation in shed	135	156	29	426	1.33	IV
Proper drainage and floor slope	68	243	9	379	1.18	V

Table 5: Practice wise distribution of adoption of recommended cattle management practices (N = 320).

Practices	Always	Sometimes	Never	Total adoption score	Mean score	Rank
Health care practices						
Timely vaccination of animals	18	123	179	159	0.50	VIII
Daily observation for signs of illness	231	89	0	551	1.72	I
Isolating sick animals	176	65	79	417	1.30	III
Reporting disease outbreaks promptly	47	208	65	302	0.94	VII
Proper veterinary treatment of sick animals	59	239	22	357	1.12	VI
Control of lice and ticks	105	159	56	369	1.15	V
Regular deworming of animals	19	89	212	127	0.40	IX
Cleaning and sanitation of shed	213	103	4	529	1.65	II
Safe disposal of dead animal carcass	23	42	255	88	0.28	X
Treatment of reproductive disorders	76	235	9	387	1.21	IV

Table 6: Relationship between selected variables and adoption of recommended cattle management practices.

Practices	Age (χ^2)	Education (χ^2)	Herd size (χ^2)	Land holding (χ^2)	Family size (χ^2)
Breeding	4.96 NS	15.49*	8.17 NS	6.95 NS	3.67 NS
Feeding	7.87 NS	16.21**	22.14**	30.42**	5.34 NS
Housing	3.29 NS	10.38 NS	19.43**	27.56**	17.34**
Health care	9.26*	19.47**	12.63*	10.15*	15.74**

**Significant at 1 per cent.

*Significant at 5 per cent.

and housing (χ^2 = 19.43**) practices and significant with health care (χ^2 = 12.63*). Herd size influence for the reason that farmers had larger herd size operate their farm commercially. They also able to invest in housing and feeding. This pattern aligns with diffusion theory, where resource-rich farmers adopt innovations rapidly while lower perceived risk (Rogers, 2003). Landholding size had a highly significant on feeding (χ^2 = 30.42**) and housing (χ^2 = 27.56**) practices and a significant effect on health care (χ^2 = 10.15*), revealed that farmer with higher land holding were able to invest frequently in infrastructure and feeding. Comparable results that land ownership highly associated with scientific dairy management practices reported by Sarwar (2021). Family size showed a strong association with housing (χ^2 = 17.34**) and health care (χ^2 = 15.74**), likely due to more family member fill the requirement of labour for maintenance-intensive activities. Panchbhai *et al*., (2017) similarly found that labour availability increase adoption. Age was not significantly associated with Breeding, feeding and housing pattern. But it was significant with health care (χ^2 = 9.26*), suggested that age influence the decision about disease management more than production practices. This observation supports earlier work indicating that experiential knowledge often guides behaviour (Rogers, 2003). These findings confirm that adoption is shaped by education, resources and labour capacity, highlighting the need for targeted extension strategies for smallholders and less-educated farmers.

CONCLUSION

The findings of this study concluded that recommended cattle management practices moderately adopted with selective nature. Farmers were adopted productivity-oriented practices specially in housing and feeding. Regarding veterinary care and scientific breeding practices adopted poorly. These adoption pattern concluded with farmers were interested in investing short term economic gain over long term. Socio-economic factors influencing the adoption decision of farmers. Education, herd size and landholding found significantly associated with cattle management practices which leads to influence on capacity and willingness of farmers to implement improved practices. Educated and resource rich farmers practices adopted rapidly, emphasizing the information access and economic strength in dairy modernization.

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Disclaimers

The views expressed are solely those of the authors and not of their institutions. The authors are responsible for the content.

Informed consent

Informed consent was obtained from all respondents; no animal experimentation was involved.

Conflict of interest

The authors declare no conflict of interest and no external influence on the study.

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