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Research Article

Feeding, management and health care practices of dairy cattle farms in Nepal

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ABSTRACT

Dairy farming is an important source of income for farmers; however, farm management practices are often overlooked. Therefore, this study aims to assess the feeding, management, and healthcare practices of dairy cattle farms in Nepal. A total of 407 households were surveyed in the districts of Ilam (86), Morang (114), Kavre (91), and Chitwan (116). The data was collected from February to October 2024. Descriptive statistics were used to compare the mean and frequency. Farms were compared using one-way ANOVA, with a post hoc test to examine variation among farm sizes. The findings revealed that 93.1% of farmers fed rice straw, while 80.8% fed Kundo or Khole as the primary feed. Feed blocks, UMMB, and urea molasses were used by 19.4%, 20.1%, and 6.4% of the farms, respectively. Similarly, on average, 45% of cattle housing was found in good condition, while 45.2% had a mud-floor mix with concrete. The adoption rate for GHPs such as disinfectant (4.9%), protective workers (16.5%), farm entry log (4.9%), grooming tools (24.1%), and record keeping (23.3%) was found to be low. The technology adoption remains at seven or fewer for 71.5% cattle farms. Mastitis (44%) was the most reported disease, followed by FMD (25%), infertility (14%), Charchare (5%), and other diseases, including lumpy skin (12%). 35.3% farms followed regular health care services, while 64.7% practiced it irregularly. In addition, the economic analysis revealed that 71% and 29% of the cost was covered by feed and non-feed inputs, respectively, while the medium-sized farm was identified as the most profitable. It is suggested to provide training and extension services on good husbandry practices, along with increasing subsidies for improved farming techniques to lower costs. Further, preventive measures for disease control, including surveillance and quarantine, are essential.

Keywords: Feeding, Healthcare, Housing, Technology

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INTRODUCTION

The dairy sector is a key source of farm income and household nutrition for rural farmers in Nepal. It contributes 9% of the agricultural Gross Domestic Product (GDP) and 63% of

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livestock GDP (NDDB, 2022). About 60-70 % of the milk produced by farmers is retained for household consumption implying an important role of dairy farming in household nutrition (CASA, 2020). The dairy cattle population is 0.92 million, producing 1.21 million tons of milk annually (MoALD, 2023a). The sector encompasses more than 1,800 primary dairy cooperatives, 55 large chilling facilities, and 765 small and medium-sized enterprises (SMEs) (NDDB, 2021) and 500,000 families (CASA, 2020) in the country. The districts with the highest potential for milk production are Chitwan and Kavre of Bagmati, and Ilam and Morang of Koshi provinces Nepal (MoALD, 2023a).

Dairy provides opportunities to strengthen two-way rural-urban linkages by ensuring the supply of milk (nutritious food) from rural to urban areas and cash flow from urban to rural areas (Gautam *et al*., 2021). Milk is a vital source of vitamins, minerals, and protein (Prasad & Kothari, 2022) and helps to increase food security (Shekhar, 2024). National policies on agriculture and dairy sectors such as National Agriculture Policy (2004), Agriculture Development Strategy (2015-2035), the National Dairy Development Policy (2021) and the 10 Year Dairy Development Plan (2018-2028), have given special emphasis to support and promote service provisions to dairy sector development and improvement of household income and welfare of farmers. Besides that, some national and sub-national government policies and programs include provisions to support dairy farmers through insurance, fodder missions, improved breeds, and animal health care subsidy programs to improve household income and nutrition.

Despite the crucial role of dairy farming, the dairy farms in Nepal are often constrained by limited access to improved forage and fodder supplies (Devkota *et al.*, 2022), quality feed (Paudel *et al.*, 2021), inadequate veterinary services (Shingh *et al*., 2020), and poor farm management (Khanal *et al*., 2022). This is associated with inadequate production skills (Tiwari & Paudel, 2018) and limited research (Shingh *et al.*, 2020). The feed deficit of 42% for metabolizable energy, 38% for crude protein, and 33% for dry matter was found in Nepal (Osti, 2020). Farmers often lack knowledge of the rational use of inputs (Adamie et al., 2022) and of the cost of production (Atzori et al., 2021). The factors affecting cost, profit (Paudel et al., 2021), as well as variations in milk output are not well understood. (Neopane et al., 2022; Solesvik et al., 2019). The technology developed by the Nepal Agricultural Research Council (NARC) is not reaching farmers adequately due to limited dairy extension services, resulting in lower production and profitability for dairy farms.

Understanding feeding, animal health services, and farm practices is crucial as they directly affect milk production, disease outbreaks, and farm efficiency. For instance, the use of nutrient-rich fodder and forage (Deen *et al.*, 2019; Wang *et al.*, 2024) and effective use of inputs (Fiorillo & Amico, 2024) had a significant impact on farm productivity. Furthermore, rising demand for milk and dairy products creates opportunities for dairy commercialization. The previous studies in livestock feeding (Acharya *et al.*, 2021; Balami & Chaulagain, 2025; Prajapati *et al.*, 2021), farm management (Dahal, 2023; Dhakal, 2022; Gautam *et al.*, 2021; Sah *et al.*, 2020), and health issues (Deka *et al.*, 2023; Kharel *et al.*, 2023; Kumari *et al*, 2020; Parajuli *et al.*, 2020) were reported.

However, the specific information on feeding, farm management and health care of dairy cattle, as well as farm-level practices, including their issues across farm sizes, is currently limited (Paudel *et al*., 2021). To address this gap, this study aims to assess the feeding, management, and healthcare practices of dairy cattle farms in Nepal, focusing on current practices,

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challenges, and opportunities for improvement. This paper is expected to provide policy makers and milk producers with helpful information on feeding, farm management and health care facilities for dairy farmers, enabling improved decision-making.

METHODOLOGY

Study Sites and Sampling Frame

The study area and sample size were chosen using the multistage sampling (Ahmed, 2024). The stages involved the selection of provinces, districts, municipalities, and milk-producing households. The criteria were the milk production volume, number of Artificial Insemination (AI) services used, and the number of registered dairy-based enterprises (NLBO, 2021). The Ilam and Morang from Koshi province and Kavre, and Chitwan from Bagmati province were chosen based on a higher concentration of milk-producing farmers. A total of 20 municipalities, five from each district, were selected based on their high potential for cattle rearing. The sampling frames were taken from the respective municipalities. A total of 407 dairy cattle farms were randomly selected from the selected municipalities of the districts: 86 from Ilam, 114 from Morang, 91 from Kavre, and 116 from Chitwan.

Data Collection

The data were collected from February to October 2024. In the first phase, the household survey was conducted using the KOBO Toolbox, and in the second phase, qualitative data were gathered through Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs). The pre-test survey was done with non-sample households, and feedback was adjusted accordingly. Then, surveys were administered in 407 dairy farms. Consent from respondents was taken before each interview. In the second phase, 30 KIIs were conducted with milk farmers, dairy processors, traders, and enablers and 10 FGDs were conducted with milk producer groups and dairy cooperatives from study districts.

Data Analysis

The data were collected and entered into STATA software version 15. The descriptive statistics were used to calculate the mean, frequency, and percentage, which were presented in tables, figures, and bar diagrams. Qualitative data and secondary sources were used to validate and interpret the data. The dairy cattle farms were classified into three categories (Dhungana *et al.*, 2025). The first category is large-sized farms, which include 101 farms (24.8%) that have an average of 18.9 cattle. The second category is medium-sized farms, consisting of 149 farms (36.6%) with an average of 8.9 cattle each. Finally, the third category consists of small-sized farms, which include 157 farms (38.6%) that have an average of four cattle. For inferential statistics, a one-way ANOVA was used to compare the differences among farms for feed rate and forage area. The post hoc test was used to assess variability within farms (Ramsbottom *et al.*, 2021). The chi-square test was used to determine the relationship among categorical variables.

RESULTS AND DISCUSSION

Socio-economic profile of respondents

The socio-economic characteristics of four districts: llam, Morang, Chitwan, and Kavre are given in **Table 1.** The mean age of the respondents was 44 years, ranging from 26 to 75 years. The average education level of the household head was 9 years, and 33% had a college degree. 72% of respondents were literate, which is close to the national literacy rate of 76.3% (CBS,

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2021). In addition, the average dairy farming experience was 8.6 years. The average land size was 0.63 ha, of which 0.16 ha was allocated for forage cultivation.

Table 1: Socio-economic characteristics of dairy cattle farms (n=407)

Variable	Mean	Variable	Mean
Age of respondents (years)	44	Land size (ha)	0.63
Education of household head (years)	9	Dairy cattle (no.)	9.55
Family size (no.)	5.3	Forage area (ha)	0.16
Experience (Years)	8.61	Milk yield (liter/cattle/day)	10.68

Source: Field Survey 2024

The average number of dairy cattle number was found to be 9.55. The milk yield was 10.68 liters, which is close to the national average of 10 liters (MoALD, 2022a). However, lower yields were reported by Poudel *et al.* (2023): 7.39 liters for Jersey and 9.30 liters for Holstein cross.

Feed Management

The findings revealed that 93.1% farmers used rice straw as their primary feed (Figure 1), while 80.8% cooked *Kundo* or *Khole* daily. The farmers are primarily rely on local feed resources, such as rice straw, crop residues, household by-products, and green fodder. This is in line with previous studies, which reported that seasonal fodders, crop residues, rice bran, and mustard cake are the primary feeds in Nepal (Balami & Chaulgain, 2025). Rice straw is the main feed (Ghimire *et al.*, 2022; Singh & Singh, 2019) but has poor nutritive value and low palatability (Singh *et al.*, 2022). The animal nutrition is undermined by farmers in Nepal (Neopane *et al.*, 2022). Low milk output is also a result of inadequate access to quality nutrition. The concentrate feed was found to be significant with milk yield (Notte *et al.*, 2020). To reduce seasonal feed scarcity, the use of preserved feed, such as silage and hay is crucial (Khanal *et al.*, 2022).

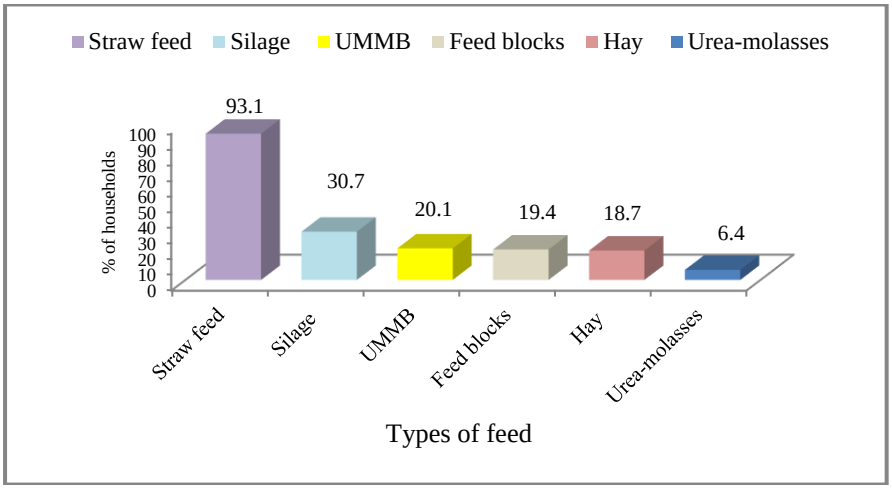

Figure 1: Adoption rate of feed types (Yes %) in the study sites

The survey result showed that the feed blocks, Urea Molasses Mineral Block (UMMB), and urea molasses were used at 19.4%, 20.1%, and 6.4% farms, respectively (Figure 1). As a feed supplement, one-third of farmers (33.9%) used vitamins, followed by minerals (30%) and

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hormones (21%). The preserved feed, such as silage and hay, was used by 30.7% and 18.7% of farmers, respectively. This means the adoption rate of nutritious feed supplements is limited. This is consistent with the findings of De Vries *et al.* (2020) in Nepal, who reported that dairy farmers lacked adequate skills and knowledge in animal feed. The KII interview with farmers, processors, and even extension workers found that they have a limited knowledge on the role of feed in milk productivity. Farmers often mentioned the seasonal lack of fodder and forage. In addition, 60.6% of farmers adopted complete stall feeding, whereas 9% practiced full grazing. This is in agreement with a study in Myanmar, which found that zero-grazing is a common practice (Myint & Muang, 2020). This is due to a severe decline in grazing land, resulting in limited grazing options (Tesfaye & Tessema, 2023). In this situation, attention to intensive care for cattle feeding is required.

While comparing across farms (**Table 2),** the findings revealed that the feed rate and forage area were 1.97 kg per cattle per day and 0.16 ha per farm, respectively. The differences among farms were statistically significant (P<0.05), with higher values at larger herd sizes. The majority of small and medium-sized farms (75.2%) allocated small parcels of land for forage cultivation. As per the FGD discussion, majority of farmers mainly depend upon seasonal forages from crop land and are often reluctant to allocate land to forage cultivation. This result was in line with Ahikiriza (2021) in Africa, who found that 57.3% of small farms used minimal technology and had no forage production. In contrast, Paul *et al.* (2020) in Tanzania found that farms with larger farmers often have more local breeds, lower feed rates, and reduced yields.

Table 2: Forage area and feed rate across farm sizes

Variable	Small n=157	Medium n=149	Large n=101	Overall N=407	F-value
Feed rate (kg/cattle/day)	1.76^{a}	1.9^{b}	2.39^{c}	1.97	11.550*
Forage area (ha)	0.07^{a}	0.13^{b}	0.28^{c}	0.16	233.503*

*a,b,c means with a different superscript in the same row differ at <0.05), * indicate significant. (Source: Field Survey 2024)*

It is vital to promote balanced feeding methods using nutrient-supplemented feed and to enhance access to quality feed resources through appropriate policy measures.

Animal Husbandry Management

The findings showed that 66.3% of large farms, followed by 45.6% and 23.3% of medium and smaller farms had permanent (*Pakki*) housing. On average, 45% of cattle housing was found in good condition, while 45.2% had a mud-floor mix with concrete. In addition, tin roofs are dominant (92%) across all farm categories. It implies that the housing structure was better on large farms; however, as per FGDs, farmers' motivation to invest in well-designed housing is low. It is consistent with research conducted in India (Saurav, 2023) and Nepal (Kharel & Dahal, 2023; Poudel *et al.*, 2025). The overall efficiency is directly impacted by their housing (Dhakal, 2022; Kumawat, 2025). A positive correlation between animal living conditions and milk production was found (Marumo *et al.*, 2022; Sankar, 2023), with milk production affected by 46% (Mylostyvyi *et al.*, 2023).

The result further described the status of indicators of Good Husbandry Practices (GHPs) (Table 3). All ten variables were compared across large, medium, and small-sized farms, and the differences were statistically significant (p<0.05). The large farms had 77.2% with concrete floors and 81.2% with proper ventilation. In contrast, only 29.2% of small farms had a concrete floor, and 28% had adequate airflow. It implies that the adoption rate of GHPs increases with

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farm size. However, adoption of disinfectant (4.9%), farm entry log (4.9%), protected workers (16.5%), use of grooming tools (24.1%), record keeping (23.3%), and calf pen (20.6%) by farmers is low, especially in medium and small-sized farms. The adoption rate of these findings is insufficient, as mandated by the GHP implementation directive 2023 (DoLS, 2023).

Table 3: Comparison of GHPs adoption rate by dairy farms (%Yes)

Indicator	Small n=157	Medium N=149	Large, n=101	Overall n=407	$\chi 2$
Concrete floor	29.2	51	77.2	54.8	28.838**
Decomposing chamber	63.7	73.2	85.1	72.5	6.831**
Farm entry log	0.0	2.7	15.8	4.9	35.510**
Individual calf pen	1.9	13.4	46.5	20.6	12.149**
Farm record	6.4	17.4	58.4	23.3	20.499**
Protected workers	7	12.1	37.6	16.5	45.177**
Proper ventilation	28	51.7	81.2	49.9	69.788**
Grooming brush	8.3	20.8	53.5	24.1	70.021**
Use of disinfect	1.3	4	11.9	4.9	15.196**
Stainless steel cane	15.9	40.3	64.4	36.9	63.127*

** and** indicate significant at 5% and 1% level, (Source: Field Survey 2024)*

The technologies adopted by farmers include improved breeds, AI, silage, hay, improved farm structures, machinery, tools, and use of digital media (**Figure 2**). The results showed that 36.9% of farmers adopted 1-2 technologies, 34.6% adopted 4-7, and 28.5% adopted 8-17. It implies that 71.5% of farmers still used seven or fewer. Almost all farmers (91.9%) practiced traditional hand milking. Farm mechanization is too low, except for the use of silage-making pits and chaff cutters in some farms. A study from Ethiopia by Korir *et al.* (2023) found that the adoption rate of technology increased with larger herd size and with years of experience, and that extension messages were positively associated with the adoption of improved technology. Thus, policy initiatives need to enhance the promotion of extension services to ensure the mandatory provision of good husbandry practices and the adoption of technology.

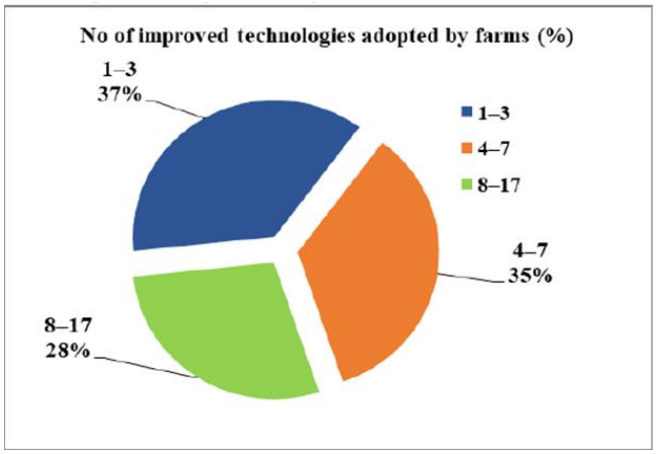

Figure 2: Number of technologies adopted by dairy farms

Health Care Practices

As shown in Figure 3, the large farms are considerably more likely to follow the routine health care practices (55%), which is lower in medium farms (27%) and small farms (24%). On average, 35.3% of farms follow routine health care services, while 64.7% follow occasionally. However, farmers are actively engaged in disease and parasite management, including

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vaccination (74%), deworming (81%), and spraying (46%). In this line, Subedi *et al.* (2025) in Nepal found that the farmers adopted the vaccination (79%) and deworming (80%).

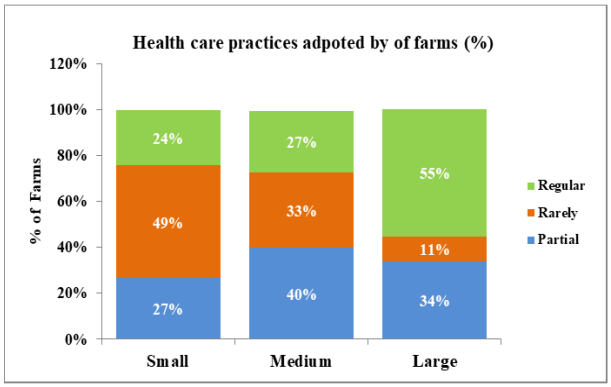

Figure 3: Routine health care practices adopted by dairy farms

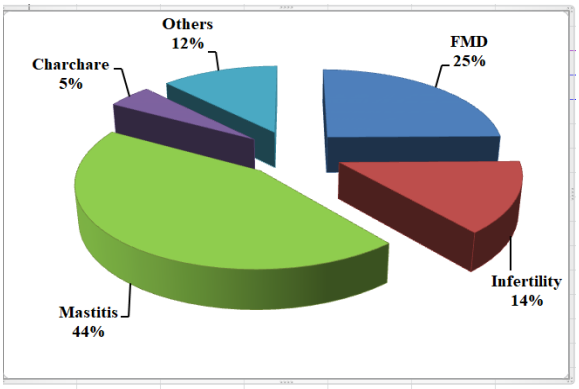

Figure 4: Health situation of dairy farms in study sites

The adoption rate for vaccination and deworming increased due to mass campaigns. This initiative is mandated by the National Livestock Health Policy (2021) to enhance the accessibility of healthy animals and products (MoALD, 2022b).

The prevalent health status of dairy cattle in the study locations is shown in Figure 4. The most widespread disease was mastitis (44%), followed by Foot and Mouth Disease (FMD) (25%), infertility (14%), Charachre (5%), and other diseases, including lumpy skin (12%). In this line, Pandey *et al.* (2023) found that mastitis was the most common disease, affecting 63.2% of farms, followed by infertility issues (13.2%), milk fever (10.5%), and helminth infections (7.9%). Similarly, Kharel *et al.* (2023) revealed that subclinical mastitis costs 8,320 million rupees, while clinical mastitis costs 4,430 million Rupees. The number of animal deaths from lumpy skin was recorded at 47,649 in 2023 (MoALD, 2023b). It is essential to deploy biosecurity measures, improve disease surveillance, and control cattle movements through quarantine.

Cost, Return and Profit analysis across farms

The analysis of variable cost per animal unit per year shows significant variations among farms (**Table 4**). Larger farms tend to rely more on concentrates, with the average cost at NRs. 34,952, whereas smaller farms incur lower costs at NRs. 27,064. The most significant expense, accounting for 57% of the total cost, is feeding. The animal husbandry costs (labor, breeding, and others) increase sharply as farm size grows, increasing from NRs. 6,936 on small farms to NRs. 12,648 on large farms. This indicates that larger farms have greater labor and management needs.

On the other hand, animal health expenditures remain relatively stable across farm sizes. In summary, feed-related costs account for 71% of total variable costs, while non-feed expenses account for the remaining 29%. Similar line: a study in India found that labor costs were 15.7% and feed costs were 64% (Gadhvi *et al.*, 2024). On the other hand, a study conducted in Uganda revealed that animal health expenditures accounted for 24.9%. In comparison, feed prices were low at 11.4% (Waiswa *et al.*, 2022), due to an extensive grazing system in natural pastures. To reduce feed expenses, it is encouraged to provide a balanced diet with a higher percentage of

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fodder and forage.

Table 4: Cost structure across farm sizes (n=407)

Variables (NRs.)	Small n=157	Medium n=149	Large n=101	Overall n=407	Share (%)
Concentrate	27,064	31,280	34,952	31,144	57
Roughages	6,392	5,848	4,624	5,576	10
Supplements	1,768	3,128	2,584	2,448	4
Husbandry cost	6,936	11,016	12,648	10,200	19
Animal health	5,168	5,984	5,712	5,576	10
Total Variable Cost	47,328	57,256	60,520	54,944	

Source: Field Survey 2024

The medium-sized farm was the most profitable with the highest gross revenue NRs. 110,976, net profit of NRs. 43,792 and BCR of 1.65 (**Table 5**). For every NRs. 1 invested, the average farm received a return of NRs. 1.46. Out of the three farm sizes, small farms had the lowest returns. The findings are consistent with previous studies of cattle farms, where 1.25 BCR (Bánkuti *et al*., 2020) and 1.75 BCR (NDDB, 2022) were reported. Bravo-Ureta *et al*. (2021) argue that reducing input costs per unit would increase farm revenue. The study found that medium-sized farms were more profitable in Europe since larger farms had more debt (Kryszak *et al.*, 2021). Large farms, on the other hand, generated the highest revenue in Turkey (Sarica *et al*., 2022) and India (George *et al.*, 2021) because of their more specialized production.

Table 5: Benefit-cost analysis

Indicators	Small n=157	Medium n=149	Large n=101	Overall n=407
Gross revenue (NRs.)	70,040	110,976	103,632	94,928
Net profit (NRs.)	15,776	43,792	32,232	30,600
BCR	1.29	1.65	1.45	1.46

Source: Field Survey 2024

CONCLUSION

This study assessed current practices of feeding, management, and healthcare adopted by dairy farms in Nepal, highlighting farming practices, issues, and opportunities for improvement. The study found that nearly two-thirds of farms still use traditional feeding methods. It is attributed to inadequate access to quality feed and poor-quality feed supplies. Nutrient supplements are not widely used in feed. The seasonal deficit in forage and fodder is the primary constraint. The majority of farms had temporary (*Kachhi*) shed housing with low adoption rates of concrete floor. A significant gap in housing quality was observed, and many basic requirements remain unmet. Small and medium-sized farms often neglect the importance of investing in a shed. The results revealed that the most commonly adopted GHPs were concrete floors, proper ventilation, stainless steel cane, and a decomposing chamber. Regarding technology adoption, the average number of technologies was seven or fewer. The results showed that only one-third of farmers followed the routine animal health care services. Mastitis, followed by FMD, Charchare, and lumpy skin, were the major diseases. The economic analysis revealed that medium-sized farms were the most profitable, with feed costs comprising over two-thirds of all variable expenses. Based on the above findings, the following recommendations have been made:

- Training programs for farmers on feed management, housing, GHP measures, and sanitary measures are essential.

- Policy initiatives should enhance extension services to mandate effective husbandry practices and promote the adoption of improved technologies while considering cost reduction strategies.
- Increasing subsidy programs for farmers to invest in locally accessible materials for improved cattle housing is required.
- It is essential to enhance disease surveillance, enforce biosecurity measures, and regulate livestock movement through quarantine measures.

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Authors' contribution
Jyoti Dhungana: Conceptualization, data collection, data analysis, methodology and write up of original draft, Devendra Gauchan: writing, review and editing, methodology, Krishna Prasad Timsina: review and editing, Hari Krishna Panta: conceptualization, writing, and editing, Loknath Paudel: review and editing,

Conflict of interest
The authors declare that there are no conflicts of interest regarding the publication of this article.

Ethics Approval Statement
Informed consent was obtained from all participants, and confidentiality of the information provided was maintained. All procedures were conducted in accordance with institutional ethical guidelines. No animals were harmed during the study.

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